A History
of
Martinsville, Virginia's
Smith River Hydroelectric Dam and Powerhouse
14 March 2025
by
Thomas M. Slaydon, P.E.
With illustrations by
J. Anthony Keller
Edited by Robert A. Gettlin

Photo by Desmond Kendrick

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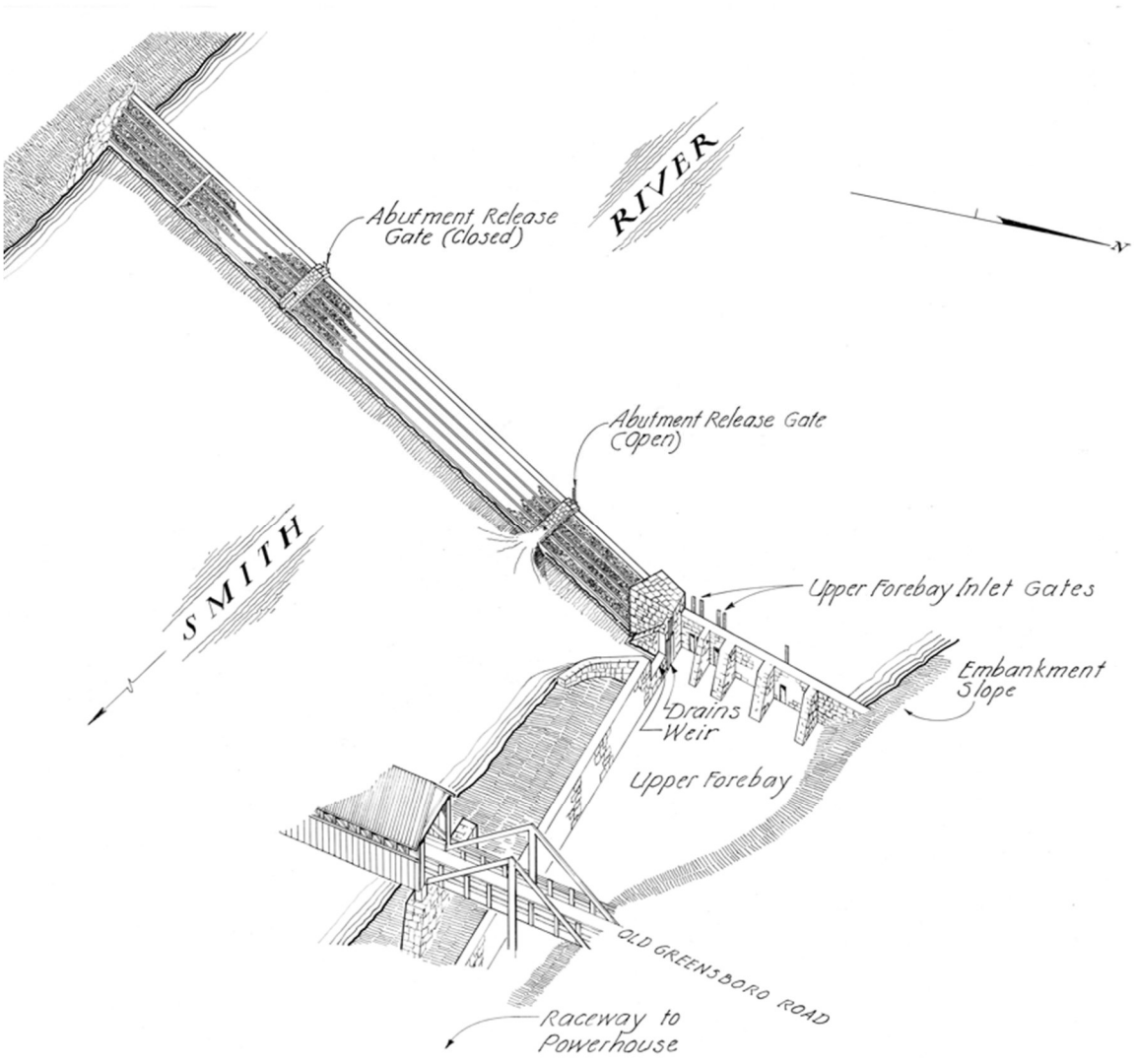
Smith River Hydroelectric Dam and Powerhouse



This report is dedicated to my parents and sister.

Harold Thomas Slaydon

September 23, 1911 — October 9, 1967

Thelma Crouch Slaydon

August 27, 1918 — October 9, 1979

Lillian Slaydon Perkins

October 9, 1942 —

Acknowledgements

Many people and agencies made this report possible.

Dennis Bowles	Mr. Bowles was an employee of the Martinsville Electric Department for 42 years where he started on the line crew and rose to the Director's chair. He provided on-site information, and he explained the 1931 and later facilities to me in detail; he had been there and done that.
Robert Gettlin	Mr.Gettlin is a good friend, a published author, and a professional editor who graciously offered to edit the report and offer valuable suggestions on how to write and rewrite. He provided so much more than grammar and punctuation corrections. Bob gave guidance on presentation, flow, and how to write for the reader. He turned an engineering report into a readable history.
Barry Jones, P.E.	Mr. Jones, also a friend, is an electrical engineer who guided my learning about electrical generation and transmission. He accompanied me on a site visit as well as challenging my ideas and reviewing the report.
Durwin Joyce and his Staff	Mr. Joyce is the current Director of the Martinsville Electric Department. He provided me with access to the facilities and his staff. They provided me with the remains of plans and specifications and gave me a complete tour of the current plant.
J. Anthony Keller	Mr. Keller is a friend I met and admired in high school. He too has an interest in civil engineering works. Kell, agreed to provide the illustrations. In so doing, we both had to understand how the facilities worked and how they were put together. He and I both ascribe to the idea that if you can draw it, you can understand it. Together, we worked and struggled to understand what was and now is there. Using his experience as a professional technical illustrator, he created illustrations that added life to the drawings to make them more understandable and enjoyable.

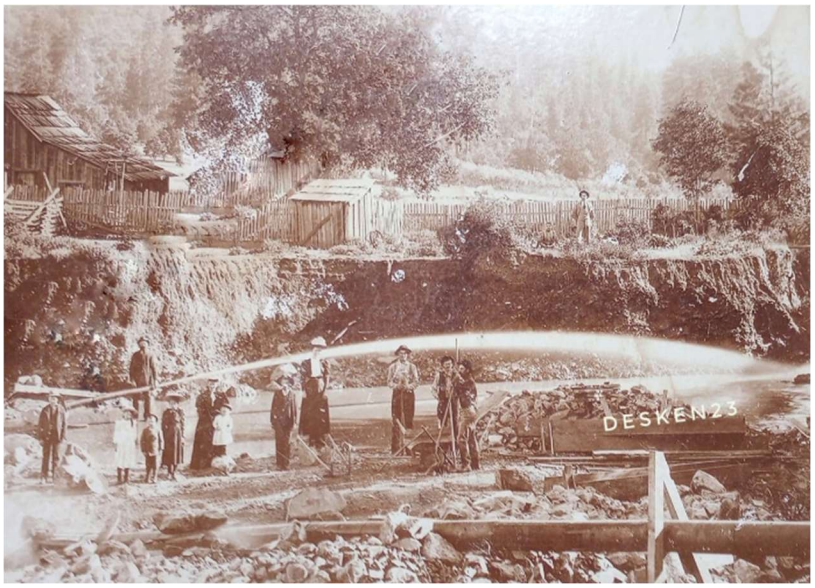
Desmond Kendrick	Mr. Kendrick is an archivist dedicated to preserving the history of the people of Henry and Pittsylvania Counties. He provided many important photographs. His wealth of knowledge of who did what, when, and why was invaluable. He accompanied Barry and me on our site visits. His work to preserve the history of the people and places of these counties continues to enrich us.
Frank Mariels	Mr. Mariels was my childhood neighbor. He made several visits to the old powerhouse and dam. He provided many photographs. He found the two main starting items – Page 913 and a powerhouse photo. Frank passed away in January 2025.
Karen Roberts	Ms. Roberts was the Acting Clerk of Council. She braved the City's storage area and found the Council meeting books. She facilitated my access to the best source of the history.
Pat Ross and Fran Snead	Ms. Ross and Ms. Snead are the Director Emeritus and current Director respectively of the Bassett Historical Society. They and the society staff responded enthusiastically to my requests to have certain aspects researched.
Caitlin Schlueter	Ms. Schlueter was the Electric Department Director's Administrative Assistant. She located and scanned the 1933 report that was so very essential.
Gail Smith	Ms. Smith was the Administrative Assistant for Mr. Dave Prilliman, deceased owner of the old powerhouse property. She provided Frank and me with the starting documents and recited what she recalled from Mr. Dave's recollections. She also provided me access to the old powerhouse.
Phillis Warren	Mrs. Warren is a Deputy Clerk, in the Henry County Circuit Court Clerk's Office. She guided and encouraged me through the laborious process to obtain on-line access to the deeds and maps and assisted no end to the actual deed room research.
Mrs. Deborah England Slaydon	She gave me two sons and still gives me all her love. She suffered through and supported my eccentric behavior through my obsession with this project. Thanks Debby.

Note for Readers

For history buffs with little technical interest, the Preface, Sections 1 through 5.5, Summary, Epilogue, Definitions, Appendices 1–4, and all the figures are recommended. For engineers, and hydro enthusiasts, the entire report is recommended. The Preface, Sections 1 through 3, Summary, Epilogue, and all the figures are suggested as starters for all others.

Preface

This report arose from my attempt to answer a question posed by Desmond Kendrick of Martinsville, Virginia, about a photograph, circa 1900, as shown here. Desmond is a history enthusiast who possesses an unfathomable wealth of knowledge of the history of Martinsville, Henry County, Pittsylvania County, and their people. He found me while researching the descendants of Slaydons buried in an old family cemetery he maintains. My forebears do indeed rest there.



Courtesy of Desmond Kendrick, archivist.

Desmond asked, “What did the photo show and where was it taken?” I suspected that the photo was on the Smith River.

Water has always fascinated me. I frolicked in creeks, built dams, constructed rafts, made waves in the tub, generated steam, became a Director of Utilities, and retired from a consulting engineering firm as a water resources engineer.

As a child in the 1950s, my family frequently drove across the marvelous multi-arch bridge just downstream of the Martinsville dam. With every crossing, I searched for the bridge troll. The dam never

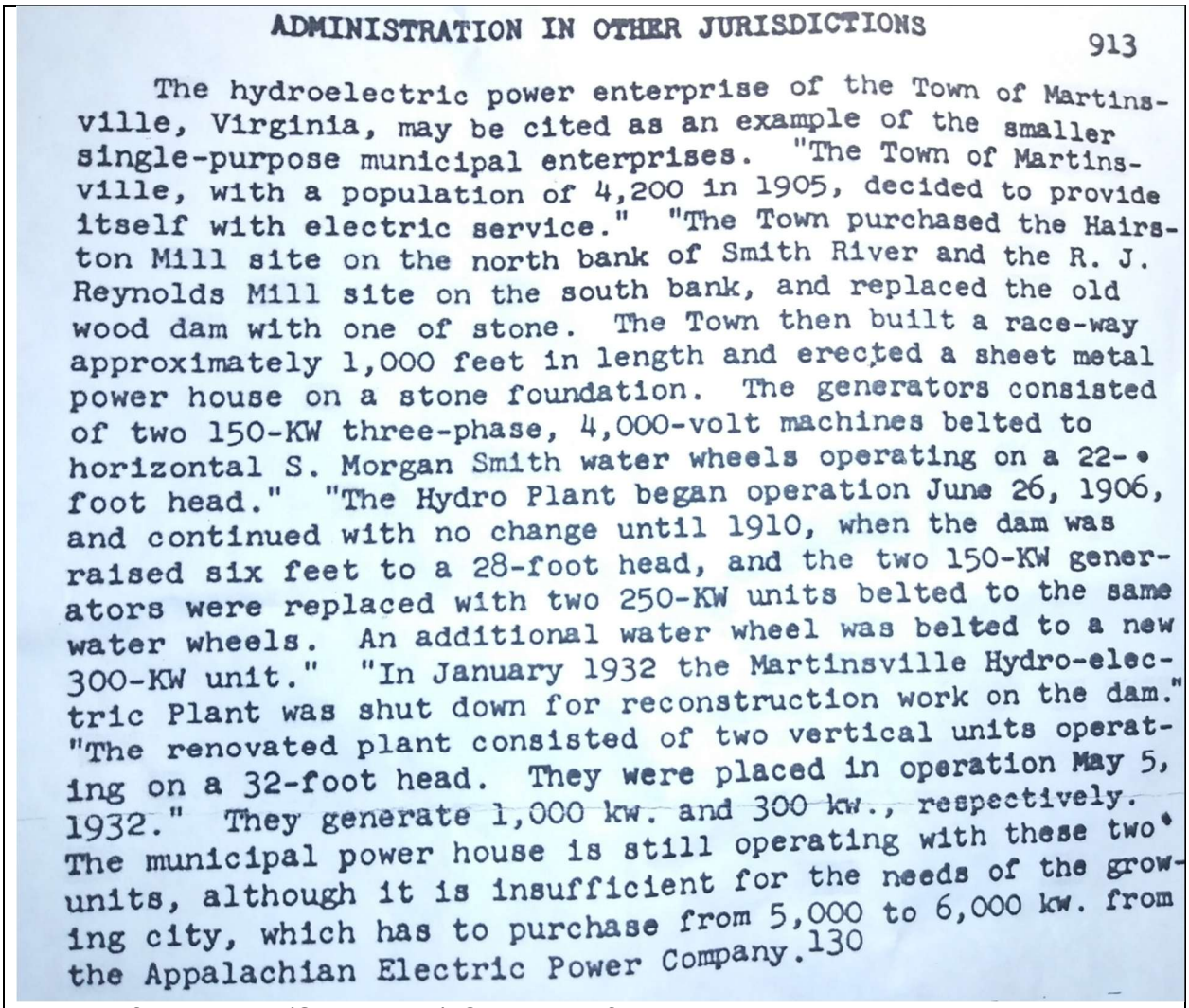
failed to command my attention, especially when water was being released. During my Virginia Tech years, I stopped at the dam one day to search for the troll and take photographs of the dam (since the troll was not in sight) ─ several of which are displayed herein. My Master of Science degree was in civil engineering with a concentration in water resources and at this writing I am registered in Virginia as a professional engineer. Perhaps my boyhood fascination with the dam was among the first steps that led me to my adult professional career. Interestingly, while rummaging through a collection of my grandfather Slaydon's photos (he was on the Martinsville Town Council in the 1930s), I found a circa 1908 photo he had made showing the dam.

Photo by William Sanderous Slaydon

Desmond's enthusiasm for history collided with my passion for water, thus a latent obsession was awakened.

I then discussed my profound interest with a friend, Frank Mariels, who also lived in Martinsville. Frank, for reasons he did not recall, had the occasion to visit the offices and truck maintenance facilities of Peoples Save Station (a local gasoline distributor) on Old Dye Plant Road. Frank met with the owner, Mr. Dave Prilliman and his office manager, Ms. Gail Smith who provided Frank the photo, shown here, of the inside of the old powerhouse and of page 913 from a book entitled American Water Resources Administration Volume II. (Shih, 1956). I also spoke on the phone to Mr. Dave who passed away before I could visit him.

Graveley Collection Courtesy of the Library of Virginia



ADMINISTRATION IN OTHER JURISDICTIONS 913

The hydroelectric power enterprise of the Town of Martinsville, Virginia, may be cited as an example of the smaller single-purpose municipal enterprises. "The Town of Martinsville, with a population of 4,200 in 1905, decided to provide itself with electric service." "The Town purchased the Hairston Mill site on the north bank of Smith River and the R. J. Reynolds Mill site on the south bank, and replaced the old wood dam with one of stone. The Town then built a race-way approximately 1,000 feet in length and erected a sheet metal power house on a stone foundation. The generators consisted of two 150-KW three-phase, 4,000-volt machines belted to horizontal S. Morgan Smith water wheels operating on a 22-foot head." "The Hydro Plant began operation June 26, 1906, and continued with no change until 1910, when the dam was raised six feet to a 28-foot head, and the two 150-KW generators were replaced with two 250-KW units belted to the same water wheels. An additional water wheel was belted to a new 300-KW unit." "In January 1932 the Martinsville Hydro-electric Plant was shut down for reconstruction work on the dam." "The renovated plant consisted of two vertical units operating on a 32-foot head. They were placed in operation May 5, 1932." They generate 1,000 kw. and 300 kw., respectively. The municipal power house is still operating with these two units, although it is insufficient for the needs of the growing city, which has to purchase from 5,000 to 6,000 kw. from the Appalachian Electric Power Company.130

Photo of Page 913 (Shih, 1956) Courtesy of Frank Mariels

It then occurred to me that perhaps historians and engineers might be interested in the story behind the dam. So, I decided to generate a report on the dam and associated facilities. Page 913 and the powerhouse photo became the starting point. My next steps included obtaining many photos, located in the Library of Virginia, Mr. Kendrick's museum, or taken by Mr. Mariels. Invaluable data was gleaned from former City Electric Department Director Dennis Bowles's written history of the dam, several conversations with Dennis, meetings with Martinsville's Electric Department staff, deeds and maps, and information gathered from site visits in December 2023 and July 2024. But, the Rosetta Stone for the history was the Town Council meeting minutes.

My greatest frustrations were the lack of plans and specifications for the dam and powerhouse and my not being able to run down to the dam to get some information or take some measurements or photos since it is 220-miles away from my home. Regretfully retention of either design or as-built plans and specifications has been a common problem for many municipalities – especially for abandoned facilities. Those

remnants of plans that were found resided in lockers or drawers at Martinsville's electric shop and had been wet and chewed by mice. They were faded and very fragile and some almost crumbled or cracked upon handling. The dam inspection reports were also stored at the electric shop. Although skilled and dedicated to their occupations in the Electric Department, the employees are not archivists. It is easy to understand that old plans did not enjoy a high priority in the early days, especially given the size of the town's staff, the lack of facilities, two world wars and a deep depression. Plans for Martinsville's projects now receive a high priority, and they are stored in the Engineering Department's offices both as hard copies and as electronic files.

This report is based upon my interpretation of the best available information at the time of writing. Even if my speculations, which are many, and my interpretations are incorrect, I will have collected an array of information for others. I freely admit that my descriptions, discussions, and conclusions are speculative and will not be free of errors, so I welcome any corrections, challenges, and new information. As I wrote this report, I realized that I had met or had known many of the people or their direct descendants that made the story described herein. No AI was used in the writing or the illustrating of this document. Mr. Jake Keller made the illustrations with Micron pens (ink) on Bristol board after dedicating hundreds of hours drafting countless iterations. My efforts spanned more than one thousand hours. Jake and I are pleased to offer this report.

Table of Contents

List of Figures

Disclaimer

This report consists of the author's and illustrator's opinions and conclusions. No engineering recommendations are stated or implied. Any use of the information in this report or the sources cited is solely at the user's risk.

1. Introduction

This report is a brief history of the Martinsville, Virginia hydroelectric generation facilities on the Smith River south of the city. It will offer a description of the who, what, when, and where. The current condition of the dam will be discussed along with the possible future of the city's hydroelectric generation. This report was written for people interested in history and for engineers, but detailed engineering descriptions have not been incorporated in the body of the report, unless necessary for a basic understanding. During the research for this report, it was discovered that, other than the reports by Yang-Ch' Eng Shih, Dennis Bowles and Bryan White, little had been recorded about the history of the facilities. So, the report will present the available information for today's historians and serve as a starting point for future researchers.

2. How the Town Council Decided to Pursue Power Production — People and History

Several reasons for Council's decision to take the risk of going into the electric power business were possible: residential quality of life, glory of the town and Council, economic development, or urging to do so by some person or group. Within the town, some of the owners of tobacco factories were John Wells Gravely, Jefferson Davis Sparrow, John Banister Sparrow, Pannill Rucker, H.C. Lester, and R.J. Reynolds - all forward-looking businessmen who surely understood the advantages of electrical power. Of course, Council could have acted on more than one reason. Economic conditions, transportation systems, and industrial conditions may have been factors. Meeting minutes and newspaper articles only allow for inferences as to their motivations.

In the late 1800s and into the 20th century, Martinsville had a population of about 4,000. Tobacco drove the area's industrial base and economy. Tobacco leaves were processed and flavored to produce plug tobacco by several factories in the town. Based upon Sanborn Fire Insurance maps, (Sanborn Fire Insurance Maps, 1908) which were published about every five years, the numbers of structures for the tobacco industry were: 14 for 1891 and 1896, 16 for 1902, and 19 for 1908. D. H. Spencer and Pannill Rucker by 1905 had installed their own direct-current steam-driven generators for lighting their facilities. (White, 1933). Previously, these structures were illuminated with kerosene lamps, and they housed a few steam-driven machines. In addition to tobacco, industries such as furniture manufacturing, wood milling and others were converting to electricity because electric

motors provided advantages that steam could not. Dwellings and other businesses such as hotels and shops had no electricity. Earlier, the Danville and Western (Dick & Willie) and the Norfolk and Western railroads had installed tracks through Martinsville making the town a convenient location for new industries.

The nearby City of Danville had been in the electric power business since the 1880s (Henry, 2024), so “Keeping up with the Joneses” might have been a factor. Having electric power available, the town could add electricity to the already existing availability of railroad transport and an ample workforce as factors that enhanced the town’s position as an attractive location for new or expanding industries. After all, Martinsville was competing with Danville, Leaksville, Bassett and other localities. Yet making the financial investment required to design and construct power generation, transmission, and distribution facilities, as well as establishing a new town department, presented quite a risk for the Council. Failure would ruin political careers and sully Martinsville’s reputation. Most governing bodies were, and still are, very hesitant to take risks. But this town Council did have the courage and foresight to take the leap into the power future.

Martinsville’s growth with furniture and textiles ultimately justified the decision. Council wisely anticipated the evolution in industry, and embraced the advice that producing three-phase electric power would support these industries and promote economic growth. According to available information, (Shih, 1956) the new electric enterprise, in addition to replacing gas streetlights, would offer service to a portion of the town’s population.

2.1 The Main Characters

Around the turn of the century, Council and the citizens were aware of electric power and its capabilities, but no one had yet taken the lead. Newspaper articles and Council’s minutes implied that Col. Pannill Rucker (1887-1930) was just the man to grab the reins. He was related through marriage to General Joseph Martin, Jr. for whom the town was named. (WikiTree - Pannill Rucker (1867 - 1930) He was an energetic and ambitious entrepreneur who was among the owners of the many tobacco factories that could benefit from electrical power. He recognized the need for electricity for the town’s industries and citizens and was motivated to seize the opportunity for electrical power, after all, he already had applied electricity to one of his factories. He was elected to town Council in 1902. (Virginia Chronicle Library of Virginia, n.d.) He reportedly served two terms, (Rucker Family Society Newsletter, 2009) but it is not known if the 1902 election

Pannill Rucker
(Graveley Family Collection Courtesy of the Library of Virginia)

was for his first or second term. He surely was one of the main citizens that persuaded Martinsville's Council to act.

Colonel Peter Hairston (1835-1914) was a prominent man in Henry County. According to his obituary published in The Reidsville Review, Tuesday, March 17, 1914, "*Colonel Peter Hairston, one of the most widely known and prominent citizens of Henry County… was educated at the United States Military Academy and the University of Virginia. He entered the war as a lieutenant and rose to the rank of colonel. Col. Hairston held many positions of honor and influence and was prominently interested in the public affairs of the county, ….Col. Hairston was at one time a valuable member of the Board of Visitors to the Virginia Military Institute for which duties his West Point training fitted him so well and for some years he served his county as a member of the State Legislature and in other prominent positions. …"* (Wiehcek, 1999). Col. Hairston was a member of a family that had lived in Henry and other nearby counties for nearly a century. They had several grand plantations.

R.J. Reynolds, who was born in neighboring Patrick County, was an aggressive and fantastically successful leader in the tobacco business. Recognizing the need for rail road proximity to his tobacco interests, he moved to Winston, North Carolina; and before his death in 1918, became the wealthiest man in North Carolina. (Pedigo, 1933) The conditions in Martinsville and Henry County were ideal for him to aggressively acquire and consolidate many smaller tobacco businesses.

2.2 The Time Line

Council's actions as documented in their meeting minutes (Martinsville, Virginia Town Council Minutes, 1903 -1931) and other related developments for the birth and evolution of the town's hydroelectric venture are presented in summary form in the time line below and with greater detail in Appendix 3. The events occurred rapidly from 1903 through 1910 then more leisurely thereafter. This time line is akin to a football game highlights reel, in which minor activities are not included. Articles from newspapers and other media are in Appendix 2.

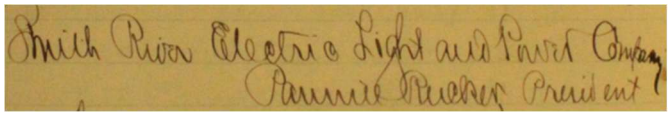
1903

- On April 10, the town Council received the report of a special committee that recommended the town pursue a steam-driven electric lighting plant if the cost was not too great. Note that in 1903 electricity could be generated using either hydropower or steam engines to spin generators. See Appendix 1.

- On April 21, Council resolved to issue a request for proposals (RFP) for the construction, operation and maintenance of a system for a steam engine electric power generation and the transmission of the power to the town. The franchisee

would be granted a 30-year non-exclusive franchise. The requirements for the franchise were for an initial capacity of 300 horsepower (hp) within six months followed by an additional 350 hp to be delivered within two years. If the capacity within the two-year period exceeded the required total of 650 hp, no more than 60 hp could be sold outside of the town. The hp requirements were stated as net hp in the RFP. Also, within the initial six months, the franchisee was required to install an electrical lighting plant (power plant) and transmission system that would be adequate to supply, for ten years, street lighting needs within the town for 20 arc lights of 2,000 candlepower at an annual rate of $70 per light plus any additional lights the Council desired of the same size at an annual rate of $60 per light. Council could extend the time by either ten or twenty years. The future rates paid to the franchisee would remain at the initial annual rate of $60 per light. Further, for non-municipal users, residents, firms or corporations, monthly rates were set for lights of other sizes. Note that in the early 1900s, steam and electrical power was expressed in horsepower, while today, electrical power is given in units of Watts where one horsepower is the same amount of power as 746 Watts.

- The only proposal received was submitted by the Smith River Electric Lighting and Power Company – Pannill Rucker, President.



The town, in July 1903, instead chose to own, build, and operate a hydroelectric power plant and they rejected the Smith River Electric and Power Company's proposal because it did not comply with the requirements in the RFP. Quite possibly, while developing their proposal, the Smith River Company determined the RFP's requirements were unrealistic.

- The Council minutes that were researched for this period no longer featured Rucker as the major player for the town's pursuit of electric power. But a lack of evidence is not evidence for the lack of his influence. He had provided the initial impetus and the momentum for the town to eventually become the "Friendly City of Progress" as it later touted itself to be.

1904

- In January, a citizens committee wrote to Council saying they favored the establishment of a town-owned and operated electrical system that would be based on waterpower. This committee also wanted to regularly confer with Council who they wanted to employ suitable engineers to investigate water rights and available horsepower. One can wonder if this committee sought to rein in Col. Rucker or was he in the shadows holding the reins? Recall that Rucker's

proposal was on the Smith River – did he have his eye on Col. Hairston's waterpower?

- In February, Council resolved that if the cost was affordable, the town should take action on transmitting electric power from some point on the Smith River (ala Rucker), to acquire the waterpower rights for 600 hp, and to retain suitable engineers.

- The engineering firm of Lockwood and Green Company was selected by the town in April to investigate the waterpower at Hairston's dam and his mill on the north side of the river. In June and July, based upon the engineers' findings, the town negotiated with Col. Hairston for the waterpower rights and the land.

- R.J. Reynolds appeared before Council in October and offered the town an option to buy his land with the improvements thereon and his waterpower rights on the Smith River across from Hairston. The Council accepted the offer and began the steps for a bond referendum to fund the hydropower project.

1905

- In March, the town resolved to build a power plant and a stone dam across the Smith River. The dam was to be 15-ft high with a sufficient base to allow for a future seven-ft increase of the dam's height without having to add additional thickness of the base of the dam.

- In June, Martinsville contracted with S.S. Ordway for the building of the dam across the Smith River.

- Pannill Rucker became the Chairman of the Henry County Board of Supervisors. The reasons for his leaving the town Council are unknown. (Rucker Family Society Newsletter, 2009)

1906

- In January, a 15-ft high dam near the Hairston mill and a powerhouse were completed at a cost of $75,000 (about $2,630,000 in 2025 dollars). (CPI Inflation Calculator, 2025) Mr. J.R. Gregory, Town Engineer, oversaw the 1906 and 1910 construction projects. He was the general superintendent of the power plant until his death in 1930. (White, 1933)

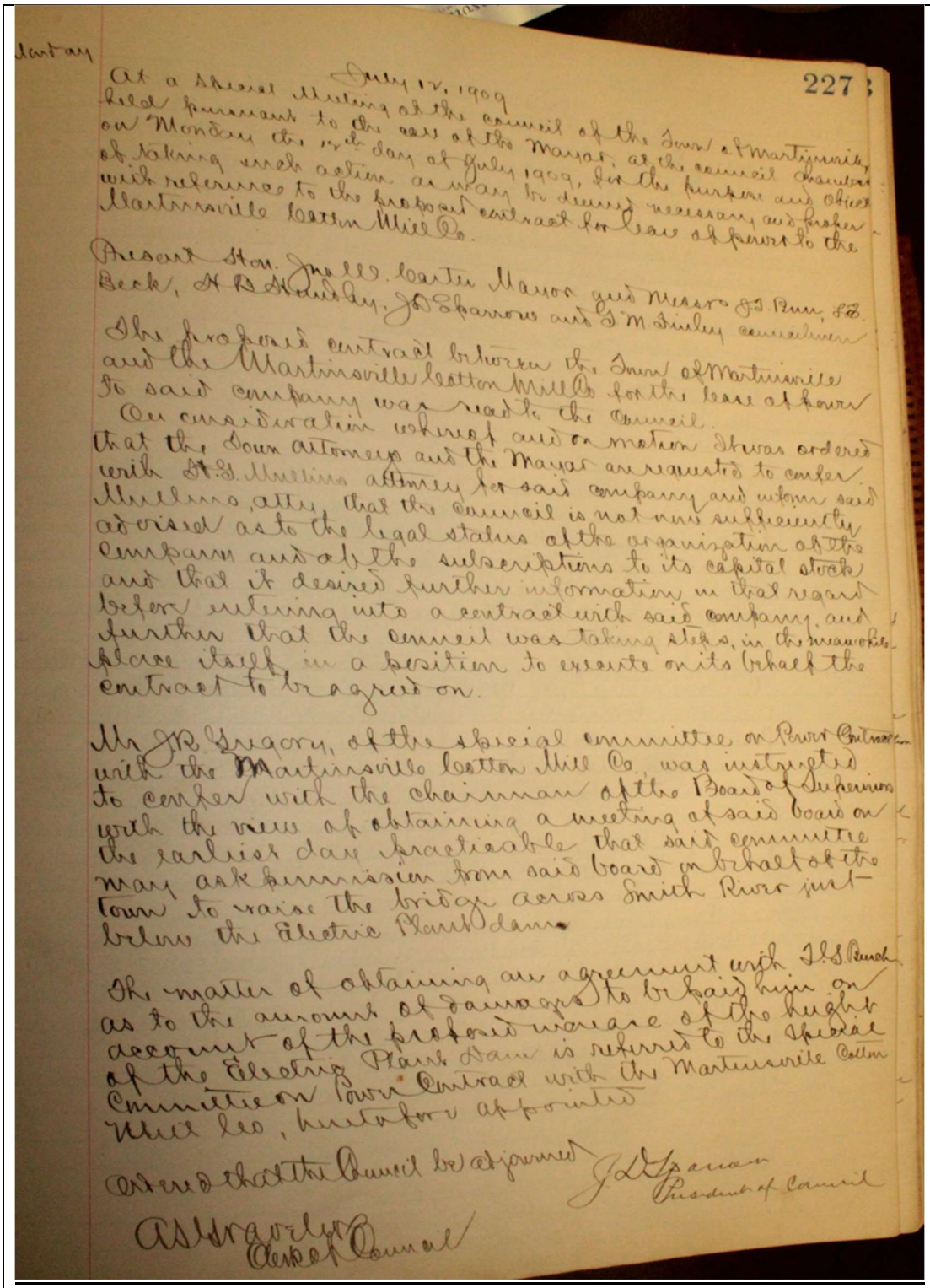
- Council defined the management and operation of the municipal electric power plant and developed a rate structure for lights and power for private citizens, businesses, and corporations.

- According to “Page 913” (Shih, 1956) a dam, raceway, and powerhouse were designed, constructed, and placed into operation on June 26,1906.

1909

- To accommodate the Martinsville Cotton Mill’s need for more electricity, the dam needed to be raised. Martinsville Cotton Mill funded the improvements.

- C.P.E Burgwgn was retained as consulting engineer to investigate the increased development of power at the Smith River facility. Compensation was not to exceed $75 plus expenses. Design was performed in the summer and the firm of Rand and Tuggle began to build the project that consisted of raising the dam by seven ft and making improvements at the powerhouse.



July 12, 1909 227

At a Special Meeting of the Council of the Town of Martinsville held pursuant to the call of the Mayor at the council chamber on Monday the 12th day of July 1909, for the purpose and object of taking such action as may be deemed necessary and proper with reference to the proposed contract for lease of power to the Martinsville Cotton Mill Co.

Present Hon. John D. Carter Mayor and Messrs. J.S. Penn, E.B. Beck, H.B. Hundley, J.D. Sparrow and S.M. Finley councilmen

The proposed contract between the Town of Martinsville and the Martinsville Cotton Mills Co. for the lease of power to said company was read to the Council.

On consideration whereof and on motion it was ordered that the Town attorneys and the Mayor are requested to confer with H.S. Mullins attorney for said company and inform said Mullins, atty. that the Council is not now sufficiently advised as to the legal status of the organization of the company and of the subscriptions to its capital stock and that it desires further information in that regard before entering into a contract with said company, and further that the Council was taking steps, in the meanwhile, to place itself in a position to execute on its behalf the contract to be agreed on.

Mr. J.R. Gregory, of the special committee on Power Contract with the Martinsville Cotton Mill Co. was instructed to confer with the chairman of the Board of Supervisors with the view of obtaining a meeting of said board on the earliest day practicable that said committee may ask permission from said board on behalf of the Town to raise the bridge across Smith River just below the Electric Plant Dam.

The matter of obtaining an agreement with H.S. Bunch as to the amount of damages to be paid him on account of the proposed raising of the height of the Electric Plant Dam is referred to the Special Committee on Power Contract with the Martinsville Cotton Mill Co, heretofore appointed

Ordered that the Council be adjourned

J.D. Carter
President of Council

A.S. Gravely
Clerk of Council

Figure 2.1 - Town Council Minutes - Page 227 July 12,1909 (Martinsville, Virginia Town Council Minutes 1903-1931 Courtesy of Karen Roberts)

1910

- Unfortunately, during construction, Mr. Watt Stone was killed in January when a derrick broke, and a heavy timber fell across his chest while he was working at the Smith River dam. (Virginia Chronicle Library of Virginia, n.d.)

- Rand and Tuggle completed the improvements by December 1910.

- Mr. C.W. Saunders of Henry County and the Council discussed the sale to the town of land and power rights for a site now known as Eggleston Falls on Smith River about seven-miles downstream of the powerhouse. The matter was no longer considered when Mr. Saunders could not satisfy the Council that he possessed the power rights. Given the distance the power from the town, and the benefits that Henry County could have realized from the powerlines, it is surprising the town even considered the Saunders option, unless it was to prevent the county from competing for industrial development. A dam and powerhouse were never built there. (In the 1980s, the city evaluated a 120-ft high dam there to generate 20mW, but the notion was abandoned.) Today, Smith River Spirits, a flourishing local distillery with divine apple brandy is nearby.

- Between 1905 and 1922, Martinsville purchased property, condemned land, purchased flooding rights, or paid for damages to accommodate flooding along the river upstream of the dam due to its backwater.

1922

A massive sleet storm hit the town on February 14 that did extensive damage to the electric wires. On the following day, John Hix Pharis, Jr., the town's electrician, rather than sending one of his crew up an icy pole, climbed it himself and accidentally touched an electrified wire and fell. A coworker, Jesse R. Chappel, " *tho small in stature, was brave in spirit, threw his body under his falling chief and thus broke the fall and saved his life."* (Hill, 1926)

John Hix Pharis, Jr.
(Graveley Family Collection Courtesy of the Library of Virginia)

1925

Council ordered that an offer for the purchase of an auxiliary steam-powered 350-kW generator be accepted. It is not known if the auxiliary generator was purchased or where it was to have been deployed. Council also agreed to purchase 500 kW from the

Southern Power Corporation for power to be generated at a dam and power house to be built at the Marrowbone Creek site. The town Council minutes were not researched for the Marrowbone dam. A powerhouse and dam were constructed at some unknown time, and no information about the town's participation was encountered.

1927

The city stopped supplying a 400-kW load to the Martinsville Cotton Mill so they could provide additional capacity for other town customers. This was possible because Appalachian Power Company (APCO) had built a power line to the Mill. (White, 1933)

1928

APCO made an interconnection to the town's grid in October 1928 through their substation at the Martinsville Cotton Mill. See White's report in Appendix 9 for the amounts of locally and purchased power from 1928 through 1932.

1930

By this time, Council realized that power generation needed to be increased. So, in August, they ordered that Allen J. Saville, Incorporated, engineers be retained to do a survey and an investigation for improvements to increase the capacity of the electric power plant, including an increase of the dam height. A fee of $1,100 was approved.

- In January, Allen J. Saville (later to become Saville and Williamson) reported that two schemes were available, and one was accepted by Council in February.

- Between June and August inclusive, the town and its consultants evaluated, negotiated and reached agreements with the team of General Electric and S. Morgan Smith (SMS) for supplying and installing the electrical equipment and hydraulic machinery at the new powerhouse and heightened dam.

- On August 18, requests for sealed proposals for three contracts to construct the dam's improvements were published and received. The work included ten unit-cost bid items and one force account item.

Contract	Successful Offeror	Successful Offer-$	Number Offerors
Civil – General construction, excavation, foundations, erection of power station, roadways, etc.	B.F. Parrott Company Charleston, W.Va.	$205,565	Nine
Structural – Crest Gates, walkways, trash racks, etc.	The Virginia Bridge and Iron Works, Roanoke, Va.	$20,675	Three
Hydraulics – Turbines, shafting, screens, and gates Electrical – electrical generators and electrical switch gear	SMS and General Electric	$45,805 (1)	One

The Henry Bulletin reported that with other minor costs the total cost of the improvement well exceeded $100,000. (Newspapers.com, August 18, 1931)

(1) Given the earlier negotiations, this contract was limited to the SMS and General Electric team.

1932

- On January 25, the old power plant was taken offline after 26-years of service and some of its electrical switch gear was removed. One turbine runner and part of a governor were relocated to the new powerhouse.

- The work was completed at the dam, and the new crest gates were lowered on May 5, 1932. From that date until today the dam and plant has been operated as a peaking plant that reduced the amount of power purchased by the town. Bryant White (White, 1933) reported that 54.2% of the city's power was generated locally. In 2024 less than 1% is generated by the city. (Joyce, 2024)

1956

The upper sections of the raceway were filled in as part of the Virginia Department of Highway's 1956 project for new north-bound lanes of Rte.220 ─ the Old Greensboro Road.

1989

A supervisory control and data acquisition system (SCADA) was installed that allowed the powerhouse to require limited human attendance and reduced the cost of power production.

1994

The rock-face spillway was covered with shotcrete (a concrete mixture that is sprayed onto a steel wire reinforcement mesh). (Bowles, Smith River Dam and Hydro-electric Plant)

1995

A severe storm caused the emergency overflow spillway on the north side of the dam to be used. The overflow spillway and a portion of the 1906 upper forebay structure were destroyed according to the Bowles's report.

1996

The emergency overflow spillway was rebuilt with a grouted rip-rap surface at a cost of $174,500 according to the report by Bowles.

Post 1996

Work since 1996 has been normal maintenance.

In retrospect, the Council's early decisions were wise. They accommodated economic development, and the original hydropower facilities served well until they were replaced with the 1930's modifications that improved the abilities of the dam and powerhouse to serve as a peaking plant to be used in concert with purchased power from APCO and others. The Smith River power plant remains in operation as of this writing, although it produces less than 1% of Martinsville's power needs.

3. The Hydroelectric Facilities

Why would the town want an electrical energy system? The answer was to do work including but not limited to running street cars, industrial motors, or powering lights. Energy is the ability to do work. Energy cannot be made; it must be found and then converted to a usable form. In the town's case they chose hydro (water) energy instead of heat (steam). This is interesting since their first inclination in the RFP was to use steam like that which had energized the 19th century industrial revolution. Hydro energy had been used for centuries in the form of water mills used for grinding corn or sawing wood. Hydro energy is derived from the energy of falling water (potential energy), and of flowing water (kinetic energy). Think of an old-time water wheel that used water -falling, flowing, or both. These mills converted the water's energy to a mechanical form for grinding or sawing. Friction and leaky wheels created energy losses that reduced the efficiency of the conversion.

Before the 1900s, turbines, also referred to as water wheels, spun a shaft , thus converting water's energies to mechanical energy. By that time, electric power

generators, machines that could convert the mechanical energy of a spinning shaft to electrical energy that could be used for powering lights or for other work were available. The turbines, generators and the mechanical linkages between them and other electrical components also suffered from various energy losses that reduced the overall efficiency of the system. For the Martinsville hydroelectric facilities, the overall efficiency was estimated to have been around 75 to 80 percent, i.e. about three-quarters of the available energy from the water was converted to electrical power that could be delivered to their electric grid.

For their project, the town found a site on the Smith River to build a dam and send captured water through an old mill race to a powerhouse where the water could be made to fall through a turbine, spin a generator and send electrical energy to the town. Figure 3.1 is an illustration of the physical components of the system in 1906 through 1931, and Figure 3.2 is a diagram depicting the flow of water and the steps in converting energy from the water to electricity.

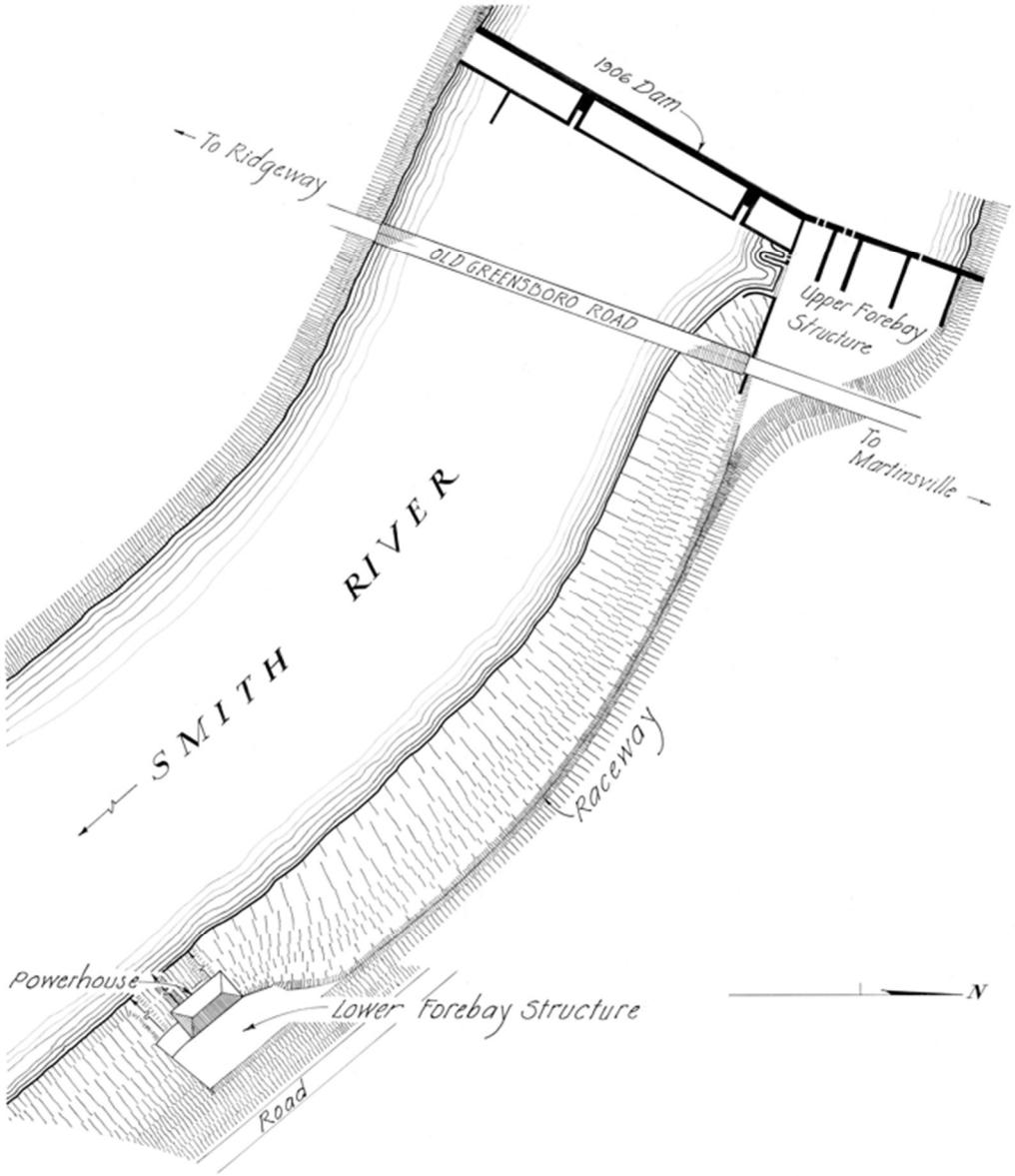


Figure 3.1 - Illustration of the Town of Martinsville's Facilities for Electrical Power Generation 1906 to 1931.

1. The dam serves to store and supply water to all the downstream components. Energy is not directly supplied to the powerhouse .

2. The upper forebay serves to store and regulate water flow to the raceway. The water in the upper forebay cannot be above the water behind the dam. The elevation difference between the upper forebay and the lower forebay defines the energy to move the water down the raceway.

3. The raceway is the channel for the water to flow to the lower forebay. No energy is supplied via the raceway to the powerhouse

4. At the powerhouse, the lower forebay stores and supplies water to the penstocks that feed the turbines. The elevation difference between the lower forebay and the tailrace defines the head or potential energy **Pe** available at the powerhouse.

5. The turbine is the machine that converts the **Pe** and the kinetic or velocity energy (**Ke** of the flowing water within the turbine) to mechanical energy **Me**. Where **Me** = **Pe +Ke** – friction losses and turbine inefficiencies. Water from the turbine is discharged into the tailrace to return to the river.

6. The generator converts the **Me** to electrical energy **Ee**. Where **Ee** = **Me** -friction losses in the belted connection to the turbine and the generator inefficiencies.

7. The delivered energy **De** to the town is **Ee**– transmission losses in the wires, transformers and other switchgear.

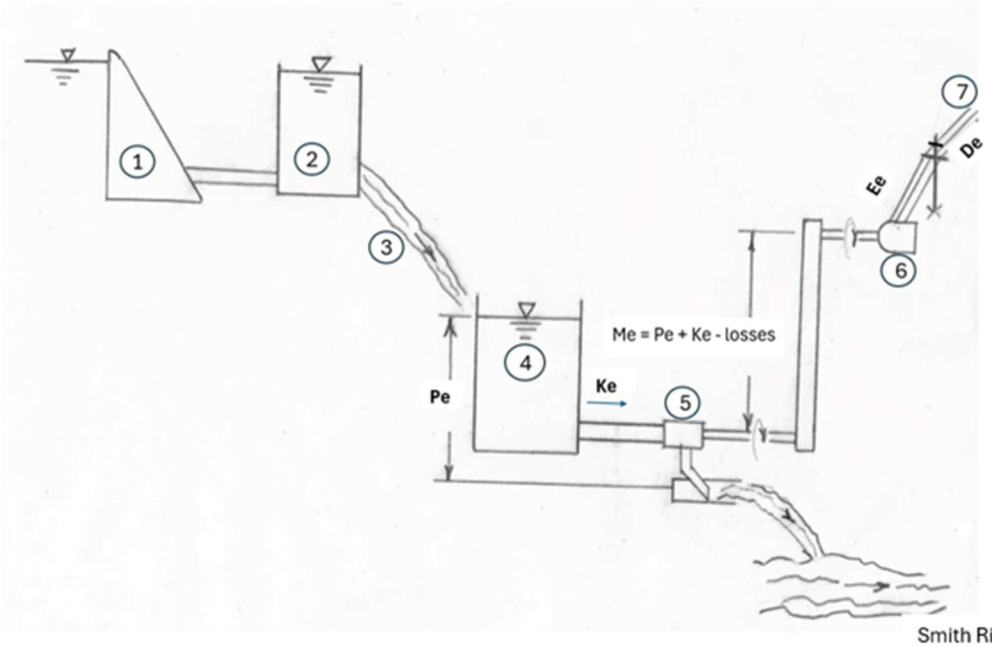


Figure 3.2 - Diagram Depicting the Flow of Water and the Steps in Converting Energy from the Water to Electrical Energy.

Martinsville, Virginia's hydroelectric dam is located on the Smith River a few miles south of Martinsville. It was not always called the Smith River. William Byrd, who led an expedition charged with surveying the Virginia-North Carolina border, discovered the river in 1728, and named it Irvines River in honor of the expedition's surveyor. Around 1748, the river also became known as Smith's or Smith River after Gideon and Daniel

Smith. (Smith River Virginia, 2024) At the dam, the Smith River has a drainage area of 378.9 square miles. Immediately downstream of the dam, the United States Geological Survey (USGS) established its Smith River at Martinsville gauging station in October 1929. Because no gauging station existed when any of the dam's projects were designed, the town Council and the engineers dealt with many uncertainties about how dependable the Smith River flows would be and how great or how small they might become. Since Hairston's dam showed that a dam nearby was feasible, the Smith River was selected as the site of the future facilities due to land and water power rights being available.

The facilities evolved through three major editions ─ 1906, 1910 and 1931. For each, and except as noted, the physical and legal components included:

A. River, land, and rights – A site and rights to use the water and to flood adjacent properties were required.

B. The rubble masonry dam – Its purpose was and remains to raise the water surface elevation and direct the water for delivery to the upper forebay.

C. The upper forebay ─ Its purpose was to receive and store the flow from the dam's north section then provide the water for the raceway in the 1906 and 1910 editions. A forebay was included within the 1931 powerhouse.

D. The open channel raceway ─ A ditch was needed to convey water from the upper to the lower forebay. No raceway was needed in the 1931 edition.

E. The lower forebay ─ The lower forebay stored water for use in the powerhouse. In the 1931 edition, the forebays were within the powerhouse.

F. The powerhouse ─ Here, water from the lower forebay would be delivered to the turbines that spun machines that generated the electricity to be sent to the town's electric grid. All the water conveyed to the powerhouse was returned to the river.

The powerhouse designers performed well because the 1906 design anticipated future modifications with minimal disturbance to continuity of operations. It is reasonable to conclude the following: The overall structure was designed with adequate generator and turbine floors to accommodate the area and weight for the third generator and turbine. Anticipating the eight-ft increase of head (the vertical distance which the water would be above the turbines) at the powerhouse, the initial east wall was robust enough to support the 8-ft of additional water pressure. On the turbine floor, a wall sleeve for the third penstock was installed. Finally, the tailwater chamber was designed for three draft tubes. Two were initially installed, and minimal time would have been needed for the third, or perhaps three were put in during the original construction. The former option is suspected because future electrical demands were uncertain. This forward planning was wise since the future demands occurred sooner than expected.

4. The 1906 Hydroelectric Facilities

In 1906, the town Council elected to acquire the land and waterpower rights to construct a dam 15-ft high and other facilities to produce and transmit electrical power for the operation of street lighting and to serve the town.

4.1 Smith River the Land and Water Rights in 1906 ─ The Environment

Two tracts of land were required to construct the dam and other hydroelectric facilities. The deeds for both tracts are given in Appendix 4. Land on the north side of the river was purchased by the town from Colonel Peter Hairston in June 1904. Property on the opposite side was acquired from R.J. Reynolds the following January. Mills were located on both tracts.

Col. Hairston probably had his parcel with a house and two mills on the Smith River for income to be earned by supplying corn and saw milling services to the area. Payment for the milling would have been a share of the corn or lumber being processed. This share could have been used to resale, pay the miller, or supply lumber and corn to the Hairston family's many plantations, several of which were close to his dam. The house probably was for the miller. Kearfott in his book Highlands Mills (Kearfott, 1970) nostalgically recalls a visit to one of Hairston's mills.

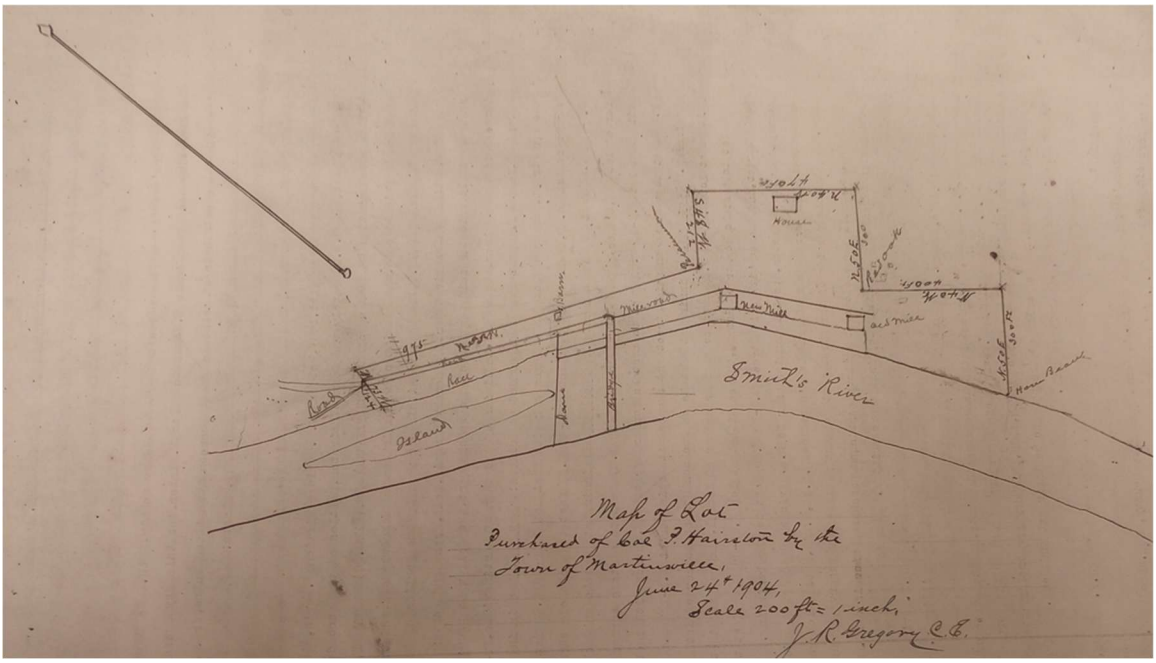


Figure 4.1.1 - Map of Hairston to Town (HCCCCO) Db33. Pg 594 (back) ─ Note J.R. Gregory was the Town Engineer. The location of the race on the south side of the mills is believed to be incorrect. See photographs later in the text. (Kendrick, 2023)

The conveyance from Hairston in Db 32 Pg 595 Henry County Circuit Court Clerk's Office (HCCCCO) did not reference a plat, but luckily one was found on the back of Pg. 594. It was not listed in the Map Book Index.

The map prepared in 1904, by J. R. Gregory, shows an island, old and new mills, a house, a dam, a bridge, and a mill race. Neither the deed nor the map said how many acres were included. By using the plat, a Google Earth screen capture (Earth, Google, 2024), and information in the deed, the acreage conveyed was estimated to have been 11 to 13 acres.

Db 32 Pg 595 and further research did not provide any information on how Hairston acquired this land. Fortunately, a 1938 book entitled A History of Henry and Patrick County (Pedigo, 1933) included references to land grants from the Governors of Virginia. Among them were many dating from 1776 to 1824, to George Hairston who was Peter's grandfather. (Wiehcek, 1999) These grants, digitized at the Library of Virginia, provided metes and bounds for the grants, but determinations of the locations of the lands were not attempted. The total land area granted was extensive, and it was concluded that Peter was an heir to them. Water rights were not addressed in the those that were read.

Hairston's conveyance to the town was complicated. The Colonel seemed more interested in protecting the residual of his land from flooding by a dam's backwater. Hairston conveyed to the town:

- Land, waterpower rights and privileges, mills, machinery, buildings and the dam;
- Rights of way to the town and to Henry County, easements, rights to quarry and transport stone from Hairston's land ─ provided the stone was used for improvements on the land conveyed by the deed or the development of waterpower at or near the conveyed land;
- Rights to flood a portion of Hairston's land where such overflow is due to the erection across Smith River of a dam not exceeding 34 ft in height. (The deed did not define the bottom of the 34 ft)

Immediately following the bearing and distance calls set forth in Db32 Pg 595, the deed goes on to stipulate that "··· *it is understood as including the river to the middle thereof, as well as the island upon which the present dam of said Hairston abuts; and the whole of said island is conveyed."* It is interesting to note that Hairston refers to the dam as his, but only the portion of the dam from the island to the north bank is within the conveyance.

On the south bank, the town acquired 15- acres of land from R.J. Reynolds by deed recorded in Db 33 Pg 136 HCCCCO. The conveyance included "···*land, water* power, *rights of way, easements, rights, privileges and properties, with the appurtenances thereto belonging, viz*: *All the water power, water rights, and privileges, dam, and buildings*···*".* No plat was found to accompany the deed. Beyond speculative investing or

winning in a poker game, the reasons for him to acquire a small saw and grist mill in 1882 on the Smith River are elusive.

This property when purchased by Reynolds included similar water rights, appurtenances, and a saw and a grist mill as described in the Reynold-to-town deed. It is not known if the mills were operational in 1905. In Figure 4.1.2 below taken from his book, The Dan River Atlas (William E. Trout, 2003), Trout showed an approximate location of a canal (raceway) for the Reynolds mill and his guess for the mill's location. A portion of a 1927 highway plan shown in Figure 4.4.1 shows a mill on the west side of the Old Greensboro Road. (Virginia Department of Highways, 1927). Kearfott (Kearfott, 1970) states that a raceway with a head gate at Irvin's Mill Dam ran on the south side of the river to a mill owned by William Davis Stultz. No vestiges of this raceway are known to exist.

Irvin's dam, also known as Hairston's Dam, also was integral to the river and water rights. Both the 1904 plat shown in Figure 4.1.1, the 1904 deed, and Trout's Page 66 shown in Figure 4.1.2 below suggest that the Hairston dam had south and north sections that met on the island in the middle of the river. The photographs in Figures 4.1.3 and 4.1.4 below appear to be of the two sections. Neither of the photographs show raceways to downstream mills.

Clarence B. Kearfott's Highlands Mills described it as follows: "*The dam was a wooden crib, gravity type structure, probably not over eight or ten feet high. In plan, it was a wide "V" with the point anchored to the toe of a wooded island in the middle of the river, the sides terminating in head gates on the north and on the south sides of the river. The head gate on the north side furnished power to Colonel Hairston's mill, while that on the south side served another mill."* He also speculated that the south side mill was owned by William Davis Stultz who is in the Reynold's chain of title.

Recall that Hairston, owner on the north bank, owned from the north bank to the center of the river, and called the dam, "his." None of the researched deeds for the Reynold's chain of title call for ownership to the center of the river or for ownership of the dam. Reynold's deed to the town did include a dam although the preceding owners' deeds did not. Neither Hairston's nor any of the deeds in the Reynold's chain spoke to maintenance of the dam, operation of the head gates, or of allocation of water to the raceways.

None of the unknowns about the ownership, maintenance responsibilities, or ownership-to-the-center of the river were an issue for the town since they acquired both sides of the river.

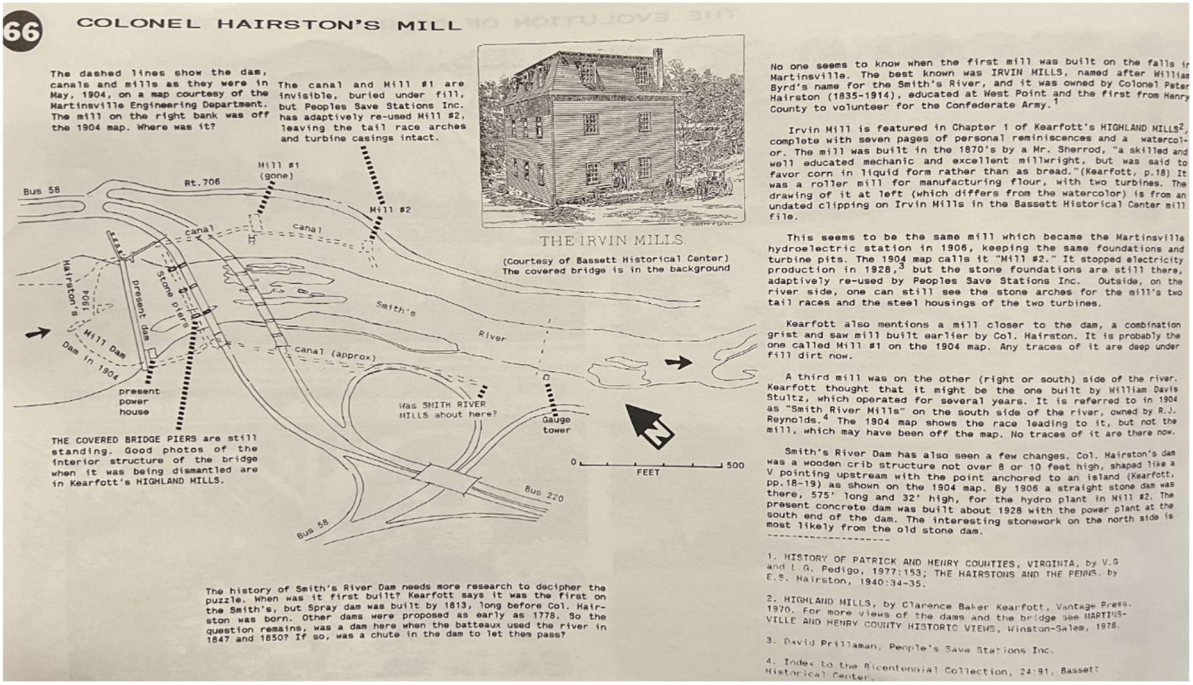


Figure 4.1.2 - Colonel Hairston's Mill – It shows Hairston's mill, dam and associated canals. It indicates the Hairston dam was above the Martinsville dam, and that the town's 1906 powerhouse was constructed at Mill #2. It also alludes to, but does not show, the R.J. Reynolds' mill which was purchased by the town. (William E. Trout, 2003)

The photographs in Figures 4.1.3 and 4.1.4 show sections of the dam.

Figure 4.1.3 - Irwin's Mill Dam Island to North Bank ─ The date and builder of the dam's construction are unknown. Photo taken 1900 by C.B Kearfott. The line of stones on the right may have been part of a retaining wall for the raceway. Kearfott has another photograph of the dam that also shows the span from the north bank to an island in the river. (Gravely Family Collection Courtesy of the Library of Virginia)

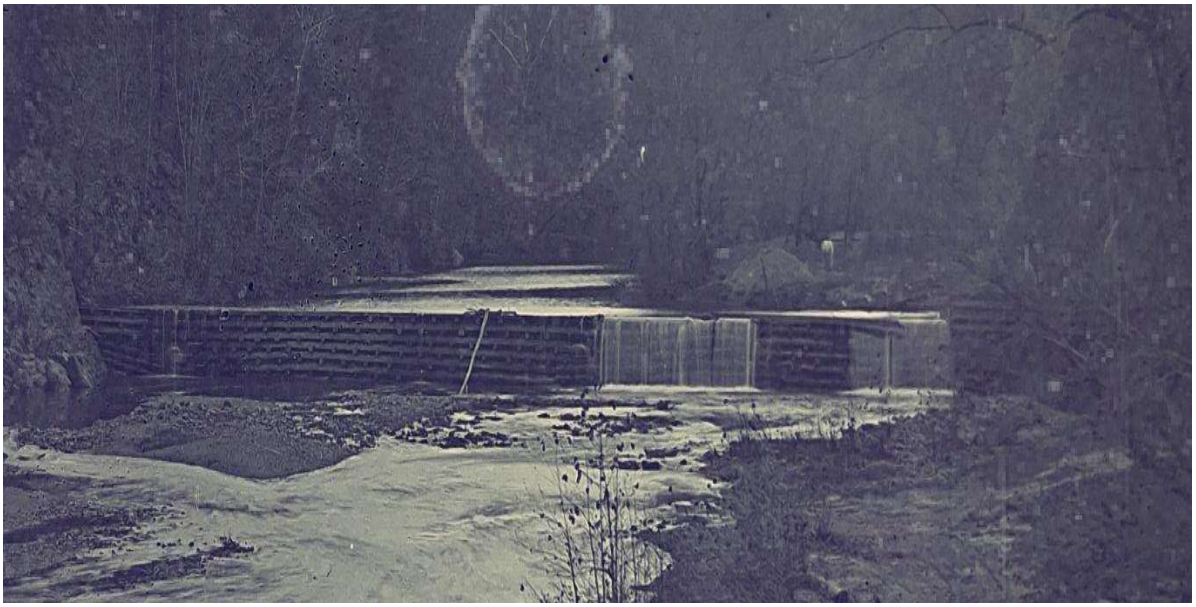


Figure 4.1.4 - Irwin's Mill Dam or Hairston's Dam ─ Note the Wood-Crib Construction. This is believed to have been the south bank to island section. (Gravely Family Collection Courtesy of the Library of Virginia)

Virginia was and is a riparian water rights state. The salient features of the riparian doctrine for water rights for non-navigable streams are that landowners along the banks, i.e., riparian, ownership extended to the center of the stream, and they were allowed reasonable use of the water. For water-powered mills, the right to take water from the stream, and to drive a water wheel was known as a mill privilege. Water-driven mills were already on the Hairston and Reynolds tracts, and loosely defined mill privileges aka water rights or waterpower rights were claimed by both owners.

Why would Reynolds and Hairston want to sell their land to the town? Reynolds probably did not need the sale's proceeds. The sale would have supported the town's electrification, thus enhancing his in-town holdings. Reynolds and Hairston could have been wanting to avoid the existing dam's maintenance and repair costs or disagreements on those costs. Reynolds probably was happy to shed the burden of operating the mill on the property. Peter Hairston's family was suffering economic difficulties from the South's loss of the War Between the States, so they were likely more than willing to sell the property to the town.

4.2 1906 Smith River Dam

As a component of the town's hydroelectric facilities, the dam's purpose was to raise the level or elevation of the river's water. This elevation increase would allow the electrical energy to be generated on or off-site. Initially, off-site generation was done by causing the water to flow to a downstream or lower elevation via a raceway. Martinsville's dam at 36.664661° N, 79.883391° W was originally built in 1906 and later modified several times. Unfortunately, plans for the 1906 dam could not be found, although remnants of the 1910 powerhouse plans were available, allowing inferences on the design of the 1906 facility. Fortunately, a few of the1931 construction documents were found that also led to inferences on the earlier dam designs. Martinsville's Electric Department graciously made these reports, plans, and specifications available. Therefore, many of the following descriptions are conclusions the author has primarily reached from the reports, limited construction documents, several photographs, postcards, and site visits.

The 1906 dam was to have a height of 15 ft with a sufficient base, estimated to have been about 21 ft to allow for increasing the height by 7 ft. Lockwood and Green Company designed the dam. It was built by S.S Ordway for $75,000. The research did not reveal if that price included the powerhouse or the transmission wires to town, although a General Electric proposal for the design of the electrical equipment was found The earliest dam spanned 379 ft from the south abutment to the forebay structure then continued 144 ft to the north bank. Figure 4.2.1 shows an overall illustration of the 1906 dam.

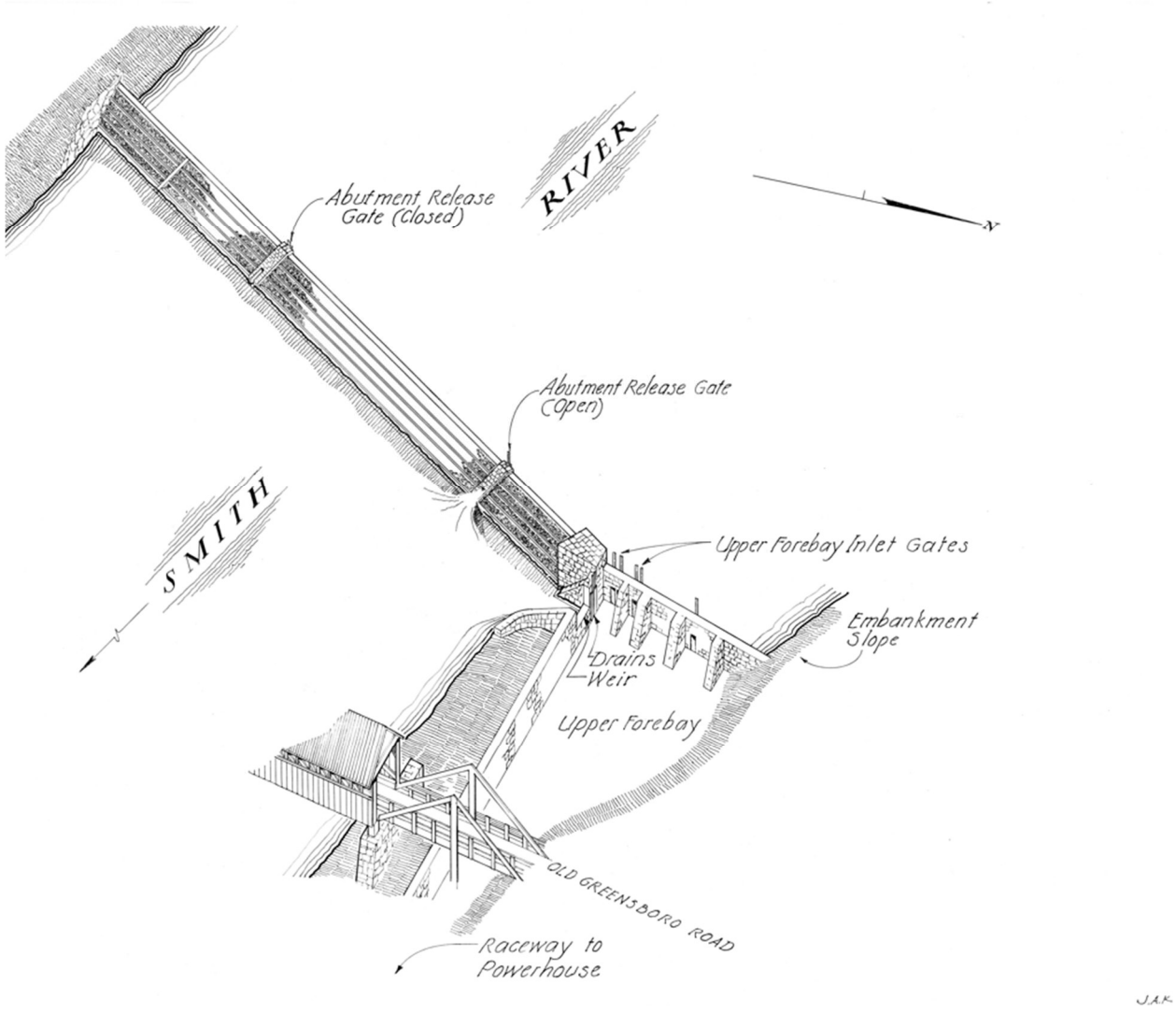


Figure 4.2.1 - Overall Illustration of 1906 Dam ─ The five-wall section between south and north abutments was 379-ft wide and the buttressed section at the upper forebay was 144-ft long.

4.2.1 1906 Dam Height

Martinsville's dam was built as part of a hydroelectric facility. The potential for power production increases with greater water surface elevations and water flow rates. So, its designers wanted to maximize both the height of the dam, and the volume of water stored in or made available from the river upstream. A higher dam increases the water's elevation and allows for greater flows to a power plant. Elevation of the water was limited by the Hairston deed. Thus, the project had to be a run-of-river facility with little water reserved for power production. The maximum height of the dam and the water behind the dam were also constrained by the backwater rights acquired from other upstream riparian owners. In addition to the deed restriction for the dam height to be no greater than 34 ft, the water level could not exceed the elevation of the approach to the old wooden bridge that crossed the upper forebay. Later plans show a crest elevation of 690 ft MSL which is the current dam crest. Relevant elevations are given in Table 1.

Table 1 Relevant Elevations at the Martinsville Hydroelectric Dam

Location	**Elevation** Ft MSL	**Remarks**
River Bed at base of Dam	665	Plans by Saville and Williamson, Inc. (Saville and Williamson, Inc., 1931)
Maximum Elevation Allowed by Hairston Deed	699	It is unknown from what elevation the 34-ft limitation was based, so 665 was selected
Dam Crest in 1988	690	Based on Wiley and Wilson 1980 Report (Wiley & Wilson, 1980)
Dam Emergency Spillway At North End of Dam	697.5	1931 Dam Emergency Spillway - Based on Wiley and Wilson 1980 Report
Upper Forebay Overflow Weir for 1910 dam	690.5	Based on Wiley and Wilson 1988 Report
Upper Forebay Wall for 1910 dam	692.5	Based on Wiley and Wilson 1988 Report
Estimated Elevation limited by Covered Bridge	690+/-	Based on examination of Figure 4.3.2
Top of 1931 Steel Crest Gates	696	Based on plans by Saville and Williamson, Inc.

4.2.2 1906 Dam Body

Photos suggest that the 379-ft dam section consisted of (south to north) a south bank abutment, a buttress, two mid-span abutments with rectangular sluice gates controlled by manual operators for water release, and an abutment adjoining the upper forebay structure. Between and perpendicular to each of the abutments and the buttress was the main body of the dam that consisted of five walls, probably concrete, of decreasing height from upstream to downstream. It is unknown how deeply the walls or abutments were keyed into the river's bottom or how much steel reinforcement was used. Rock rubble, possibly unmortared, was placed between the walls. Figures 4.2.2 and 4.2.3 below show portions of the 1906 dam and Figure 4.2.4 provides details. Access to the gate operators seemed to have been by boat or by walking across the upstream-most wall, so adjustments surely were rare. Figure 4.2.2 shows flow through one of these mid-span abutments.

The upper forebay structure comprised the remaining 144 ft of the dam. The right side of Figure 4.2.3 shows the structure.

Figure 4.2.2 - 1906 Dam Without Overflow but with Release ─ Note Hairston's barn and other structures on the north bank are visible. The purpose of the pulpit-like item is unknown. (White, 1933)

Figure 4.2.3 - The 1906 Dam with Overflow but no Release ─ Two Midspan Abutments and the 1906 upper forebay structure on the north bank can be seen. (White, 1933)

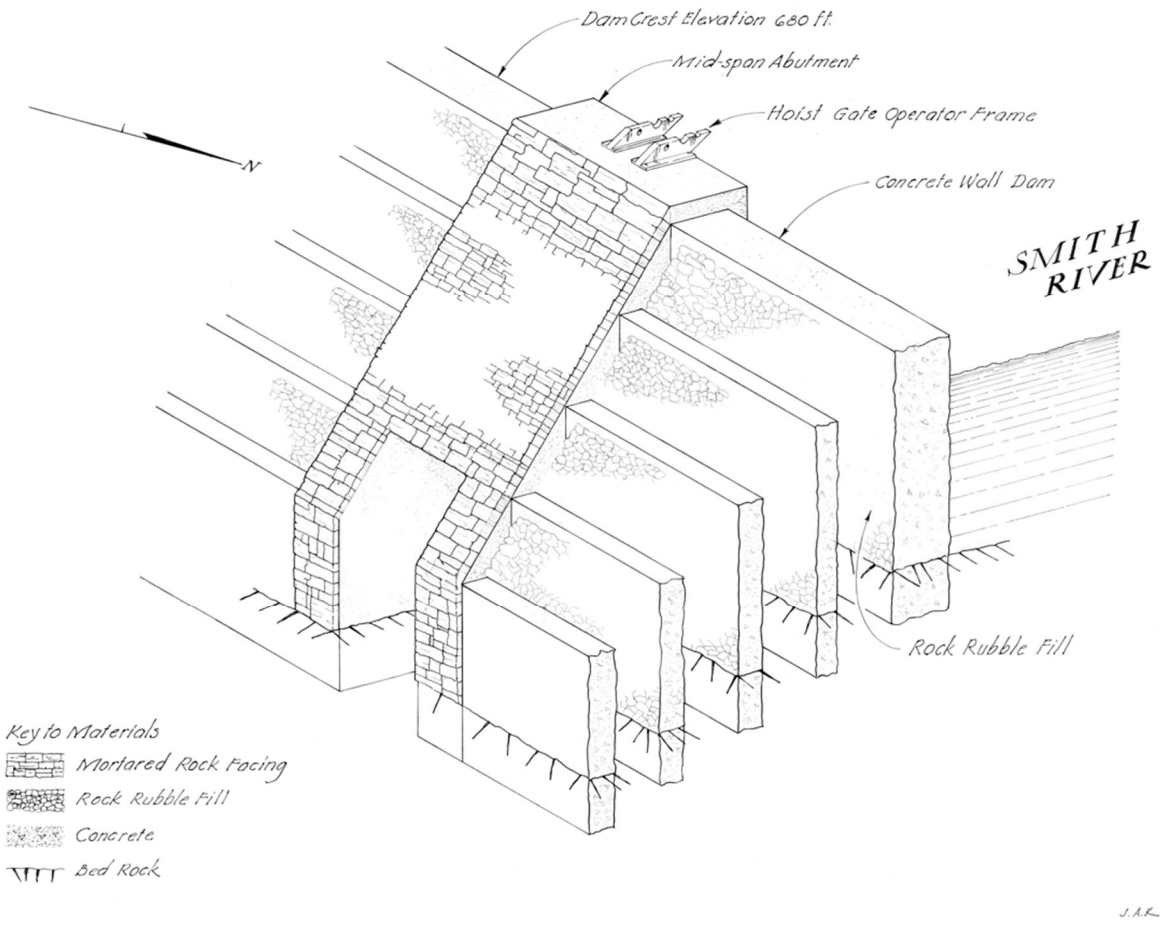


Figure 4.2.4 -Illustration of Details of 1906 Dam's Five Walls and Rock Rubble Fill and a Mid-Span Abutment

4.3 1906 Upper Forebay Structure

The upper forebay structure served to convey the raised river water from behind the dam to the raceway. The forebay was a pool of water upstream of the generating machines that made the electric power.

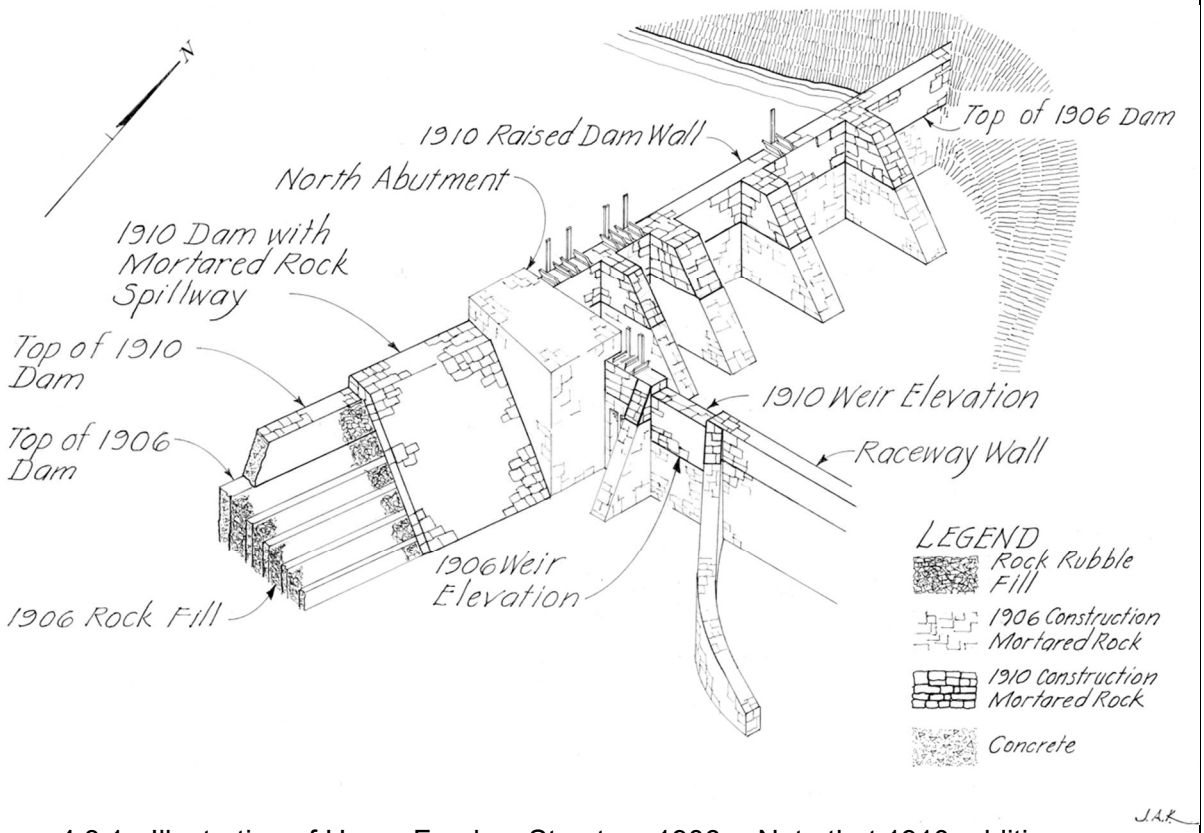


Figure 4.3.1 - Illustration of Upper Forebay Structure 1906 ─ Note that 1910 additions are shown in heavier lines.

Figure 4.3.2 - Upper Forebay Structure and 1910 Dam showing the Approach to the Old Covered Bridge (Gravely Family Collection Courtesy of the Library of Virginia)

On Figure 4.3.2, the overflow weir can be seen with a board (not OHSA approved) across it for access to the hoist gate operators. Prior to 1910, the weir wall, weir, northern dam abutment, the dam and buttresses were seven-ft lower than the photograph shows.

Figure 4.3.3 - Upstream View of the Upper Forebay at the Inlet Gates (Gravely Family Collection Courtesy of the Library of Virginia)

In Figure 4.3.3, four of the five inlet gates on the northern section of the dam are shown upstream of the dam's four north side buttresses.

The forebay was confined by the dam on the west (upstream), the earthen fill for the Old Greensboro Road on the north and east sides, and the structure wall on the south. Two other sluice gates were built in the structure wall just west of the overflow weir. These gates were used to drain the forebay and release sediment. Figure 4.3.4. shows the openings. The gate hoist and stems for the drain sluices were like those on the inlet gates. Details on the S.Morgan Smith gate hoists are given in the appendices.

The overflow weir was provided to keep the forebay's water surface below the covered bridge approach and the Old Greensboro Road. Immediately south of the overflow weir was a wing wall that directed the weir discharge to the river. Attached to this was a raceway wall that separated the forebay and upper portion of the raceway from the

river. Its top was built to the 1910 elevation. Finally, the raceway began at the southern end of the raceway wall and began its journey downstream to the powerhouse.

Figure 4.3.4 - Photograph in 2023 of the 1910 Upper Forebay Structure ─ Vestiges of the two sealed forebay drains, gate hoist frame, overflow weir and wing wall can be seen. The 1906 structure was lower. It is suspected the weir and wing wall was covered with shotcrete in 1994. The remains of the raceway wall to the east were washed away in 1995. (Mariels, 2023)

4.4 1906 Raceway

Water to drive the turbines was conveyed by a 650-ft long open earthen channel or raceway from the upper forebay at the dam to the lower forebay at the powerhouse. The raceway perhaps was the old mill race or at least followed the its route as shown in the plat of the Hairston conveyance to the town. The regulation of the flow from the upper forebay structure and to the raceway was controlled by sluices between the dam and the upper forebay. See Figures 4.3.1 through 4.3.3 above.

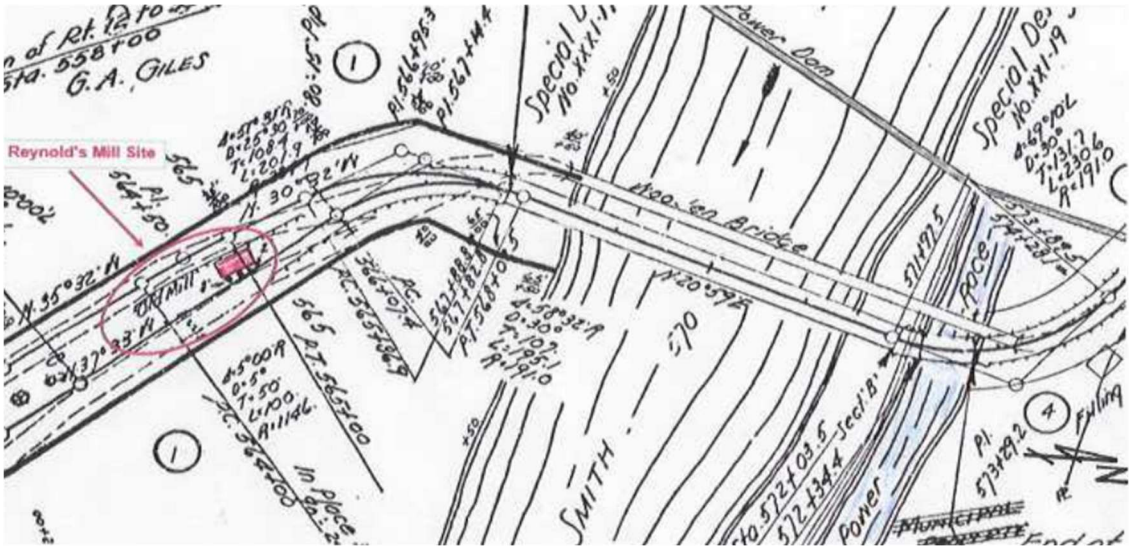


Figure 4.4.1 - Raceway and Upper Forebay from Sheet 4 of 1927 Virginia Department of Highways' Bridge Plan for Current South Bound Lane ─ Note the site of the Reynold's mill is shown on the west side of the Old Greensboro Road. Lane (Virginia Department of Highways, 1927)

No original raceway design information has been found, but Virginia Department of Highways' plans for the 1927 and 1956 bridge projects (VDT, 1956) show cross sections of the raceway where the bridge projects passed over it during the bridge design. Only the 1927 cross section reflects an operational raceway. Since the raceway did not affect the bridge design, save avoiding locational conflicts in 1927, the detail on the cross sections is limited. These plans are shown as Figures 4.4.1 and 4.4.2. The 1956 project was not kind to the 1906 facilities. The raceway, shown as "*mill race*", was to be filled in "…*as directed by the Engineer*…", and most of the eastern section of the raceway wall was demolished. Note that the current emergency overflow spillway occupies the area where the structure was demolished.

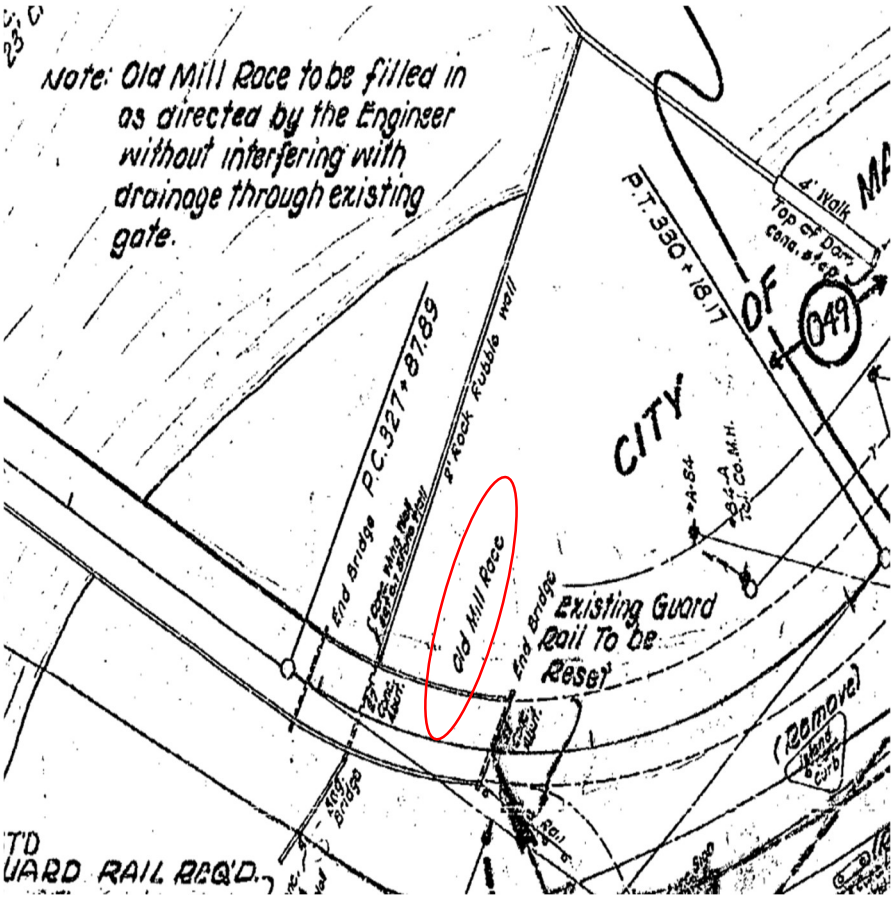


Figure 4.4.2 - Raceway and Upper Forebay from Sheet 6 of 1956 VDH Bridge Plan for the New North Bound Lanes of U.S. Rte 220 (VDH, 1956)

Dimensions of the raceway are unknown except for the crude cross sections from the VDH plans. It is suspected that the raceway was a larger open channel than the Hairston mill race because more water was needed for hydropower than milling. The 1904 map, VDH's plans, page 66 in Trout's book, and the beginning and ending sites provide the only information as to the location of the raceway since no evidence could be found during site visits. The only photograph found of what is believed to have been the raceway is shown in Figure 4.4.3 below.

Figure - 4.4.3 - Raceway Remnants ─. Looking downstream possibly near the old powerhouse
(Courtesy of Desmond Kendrick, archivist)

Given that the size and slope of the raceway are unknown, it may have been a limiting factor for the capacities of the 1906 and 1910 systems.

4.5 1906 Lower Forebay Structure

Water in at the raceway was delivered to the lower forebay structure and its pool of water at the powerhouse. Large pipes called penstocks connected the pool to the turbines. The structure consisted of water containment walls and berms, gated connections to the penstocks, and an overflow weir to return the unused water to the river. Plans for this facility have not been found. This structure was constructed with the same mortared rubble as the dam and upper forebay structure. The original structure was part of the 1906 project and Figure 4.5.1 is the only exterior photo found of it. The photo shows a wall and berm along the east wall of the powerhouse.

Figure 4.5.1 - Original Powerhouse and Lower Forebay Berm ─ The gentlemen in the doorway were plant engineers. (Note location of the door on the north powerhouse wall, the wall/berm height at the east wall, and the hoist gate stems). The two poles leaning against the building may have been rakes for the trash racks. Harold Gravely is standing outside the door. The leaning is a result of the Author's copying at the Library of Virginia. (Gravely Family Collection Courtesy of the Library of Virginia)

As previously indicated, water was stored in the lower forebay and from there it either flowed into the penstocks to the turbines or returned to the river through the lower forebay structure as shown in the illustration in Figure 4.5.2 below.

This illustration shows the lower forebay began with the raceway from the north and then was contained by the road embankment to the east; a buttress wall on the south; the overflow weir wall, powerhouse's east wall, and earthen berm on the west. Along the east powerhouse wall there were three sets of trash racks, gate hoists and gates for three penstocks. South of the powerhouse a hand-operated gate hoist was installed to manually drain the lower forebay and to remove sediment. Another buttress was installed to reinforce the weir wall. Finally, a weir was installed to limit the water level in the lower forebay. A stilling pool received the drain flow and weir overflows. From this pool, water overflowed into a flume that directed it back to the Smith River.

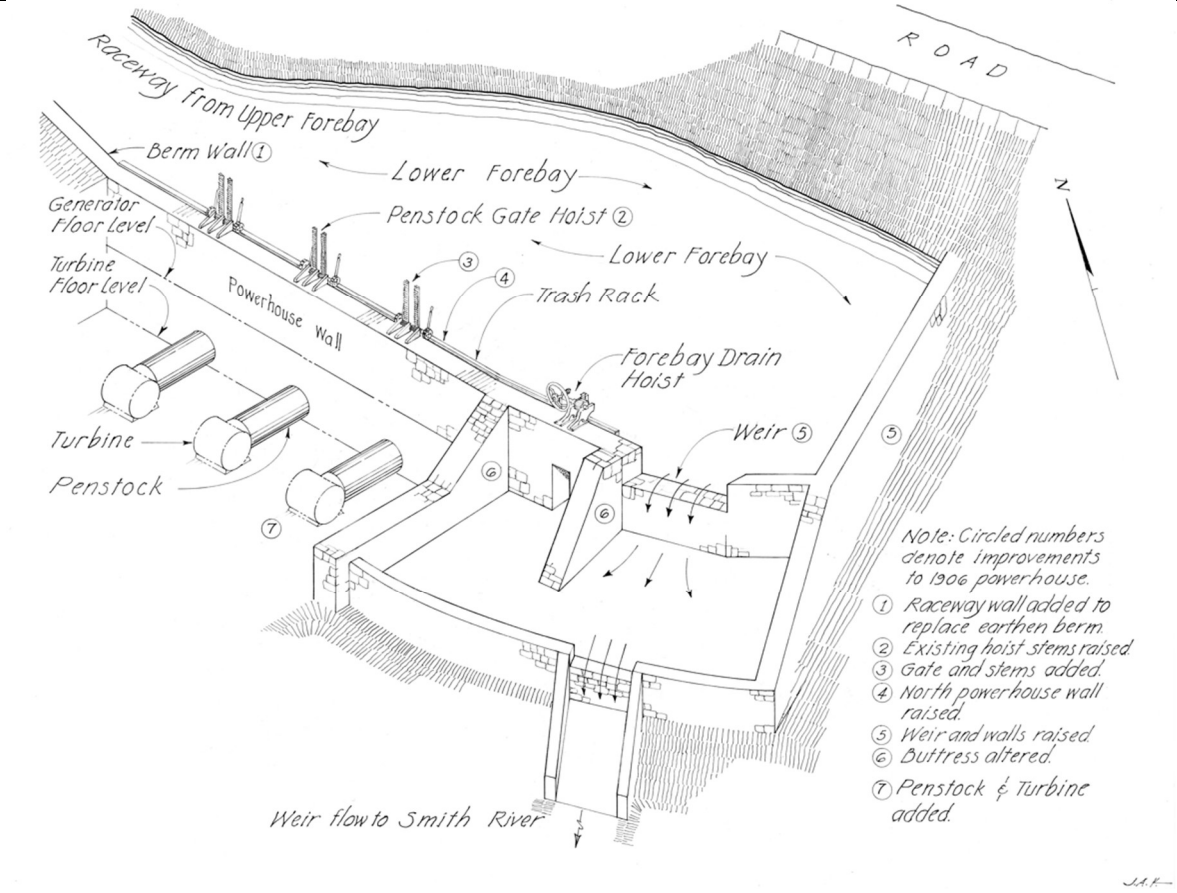


Figure 4.5.2 - Illustration of the1906 Lower Forebay Structure ─ The 1910 improvements are noted.

4.6 1906 Powerhouse

The powerhouse contained the turbines, governors, generators, and electrical gear used to generate electricity and connect to the town's electric transmission system that was also constructed contemporaneously with the 1906 project. The powerhouse was constructed at the site of the old mill drawn on the 1904 plat as shown in Figure 4.1.1. Figure 4.5.1 above shows the 1906 powerhouse. Today the site's address is 174 Dye Plant Road, Martinsville, Va.

Plans were not found for the 1906 powerhouse designed by Lockwood and Green Company and constructed by S.S. Ordway. Based on interpretations of photographs, the powerhouse had a generator floor, a turbine floor, and two tailraces for three turbines. Also, nothing was found that showed how access was made to the

powerhouse. Figures 4.1.1 and 4.1.2 show a road east of the raceway, and Figure 5.5.1 shows a line of power poles along a road. A bridge across the raceway on the north side of the powerhouse is suspected because the lower forebay structure would not have accommodated a south side bridge.

4.6.1 Generator Floor

The roof and powerhouse walls at the generator level were sheet metal and were supported by the turbine level walls made of mortared rock similar to the dam and other structures. Wood was used for the generator floor. Figures 4.6.1, 4.6.2, and 4.6.3 show the generator floor with switch gear, generator, generator exciter, and wheel governor. The railing is believed to be for stairs leading to the turbine floor. These three figures reflect the 1910 edition since no photographs were found of the 1906 interior. Page 913 from American Water Resources Administration Volume II indicates that the original 1906 powerhouse contained two SMS wheels (turbines). The turbines were Francis style in which the falling water turns the radial-vaned turbine runner. The turbines were connected by pulleys and belts to the two 150-kW, three-phase generators which converted the mechanical energy delivered by the turbines to electrical energy.

Martinsville's powerhouse produced three-phase alternating current (AC). Three-phase current is a type of electricity used for large motors. For households and smaller electrical loads only one of the three phases would be used. The AC current had a frequency of 60 cycles per second (Hz). In the USA 60 Hz was and remains the standard.

The frequency and phasing of the grid and generators had to match before the generators could be connected (brought on line) to the power grid being served. This process is called synchronization. In addition, after the matching, the generators' speed (RPMs) had to remain constant to maintain the proper frequency and phasing (timing of each of the three phases) of the current that was being generated. From 1906 until the 1928 interconnection with APCO, grid phasing would be set by the generator that was running in the powerhouse. That is, the generator that was being brought online would have to synchronize to the operating generator(s). Also, some minor deviation from 60 Hz. was permissible so long as the generators were synchronized with each other. After the APCO interconnection, powerhouse generators had to be synchronized to APCO.

Powerhouse operators monitored electrical gauges to determine when to start and stop generators. Ingenious electrical means, using three light bulbs, were used by the operators to determine when the generators were synchronized to each other and could be connected to the grid.

Each generator and the turbine to which it was belted worked as a team. When the turbine spun faster, the generator did too. So, to synchronize the turbine/generator pair to the grid, the team's speed would be adjusted by controlling the water's flow rate through the turbine using the wicket gates built inside the turbine and that preceded the runner.

These wicket gates were opened and closed by the governor assembly. This assembly was set by the operators and then it maintained the desired speed of the turbine/generator team. The governor was analogous to the speed control on a car.

The 1906 governors were mechanically linked to the turbine with a wicket shaft instead of the belted connection shown in Figure 4.6.3 as used in 1910. A brief description of how the 1910 governor, like the one seen in Figure 4.6.2 at engineer Pharsis's feet, was set for synchronization is given below: Please refer to Figure 4.6.3. The engineer who was pacing, would go to the *Governor Adjustment Wheel (9);* and would start turning it until the engineer who had been sitting in a chair playing sudoku was now using the ingenious electrical means would yell out," It's good!" Note that the wheel *(9)* had moved the *Governor to Turbine Wicket Shaft Belt (8)* and adjusted the wickets and water flow rate. The *Turbine's Shaft (4)* turned the *Turbine Shaft to Governor Belt* (6). Mechanical wizardry inside the *Governor* (7) would decide if the turbine speed needed adjustment and if it did, the wizard would cause the belt (8) to move accordingly. Once the engineers were satisfied with the synchronization, they would throw switches to connect the generator(s) to the grid and return to their sudoku and pacing. Figure 4.6.2 shows a1906 governor that was mechanically linked to the turbine with a wicket shaft instead of the *Turbine Wicket Shaft Belt (8)* used in 1910. Wicket shafts from the turbine shafts to governors were used for two generators in 1906 and 1910. Today, modern equipment called synchroscopes that do not play sudoku have replaced the light bulbs.

Figure 4.6.1 - Interior of 1910 Powerhouse ─ A visitor is on the right and Mr. Pharsis is to the left. A 1906 generator, exciter, and 1906 governor are seen to the right. Electrical control panel and switchgear are on the upper left. The gentlemen are looking down into the turbine floor. (Gravely Family Collection Courtesy of the Library of Virginia)

Figure 4.6.2 - Interior of 1910 Powerhouse with Mr. John Hix Pharis, Jr. ─ He is observing (back to front) the northernmost 1906 generator, belt to exciter, exciter, and 1906 governor. The equipment shown was installed in 1906. The middle equipment was the same as in the northern one. Equipment installed in 1910 was at the southernmost generator. (Gravely Family Collection Courtesy of the Library of Virginia)

4.6.2 Turbine Floor

The concrete turbine floor was under the generator level. It contained two SMS turbines operating on a 22-ft head, and two penstocks. Water from the lower forebay passed through large wooden gates to the penstocks thence to the turbines. The wooden gates could be used for on/off control of water flow. This flow, destined for the turbines, would be regulated by the governor as described above. The runner was the heart of the turbine where the water's potential and kinetic energies were converted into the mechanical energy that spun the generator. Please refer to Figure 3.2.

Water that had passed through the turbine was then discharged by the curved-elbow draft tube into the tailrace. The draft tubes served several purposes including directing the discharge toward the river, increasing the turbine's efficiency by capturing more kinetic energy, and reducing the chances of cavitation causing erosion of the runner at the turbine's outlet. To work properly the outlet of the draft tube had to remain submerged.

The generator floor, turbine floor and tailrace chamber are depicted in Figure 4.6.3. Because no plans or interior photographs for the 1906 power house were found, the illustrations were based on available 1910 information.

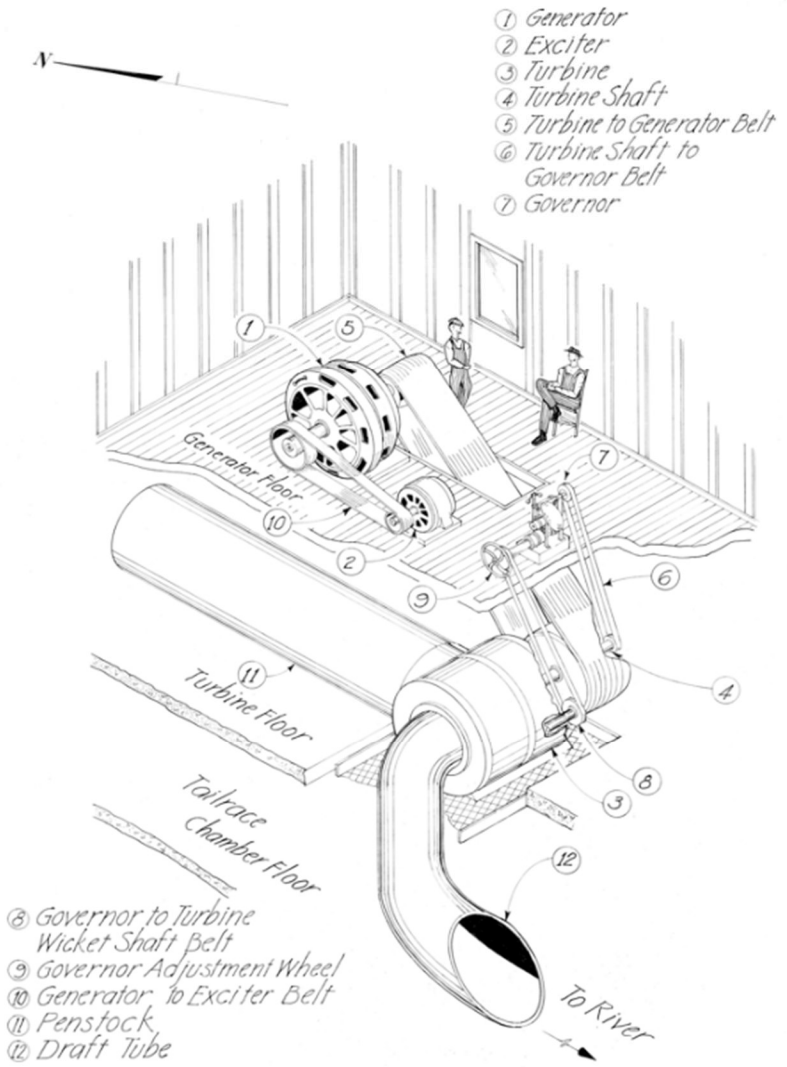


Figure 4.6.3 - Illustration of the Generator Floor, Turbine Floor, and Tailrace Chamber ─ This illustration is at the southeast corner of the powerhouse. The 1910 belted linkages between the southernmost turbine, generator, exciter, and governor are shown. No electrical wires are shown. Instead of the turbine to governor belts, shaft linkages were used in 1906.

4.6.3 Tailrace Chamber

The tailrace chamber in which the two 1906 draft tubes were located was below the turbine floor.in the northern and middle sections. Figure 4.6.4 shows the 1910 chamber with its third draft tube installed. No information was found on the 1906 chambers, but they were assumed to be similar to the 1910 chamber for which data was available.

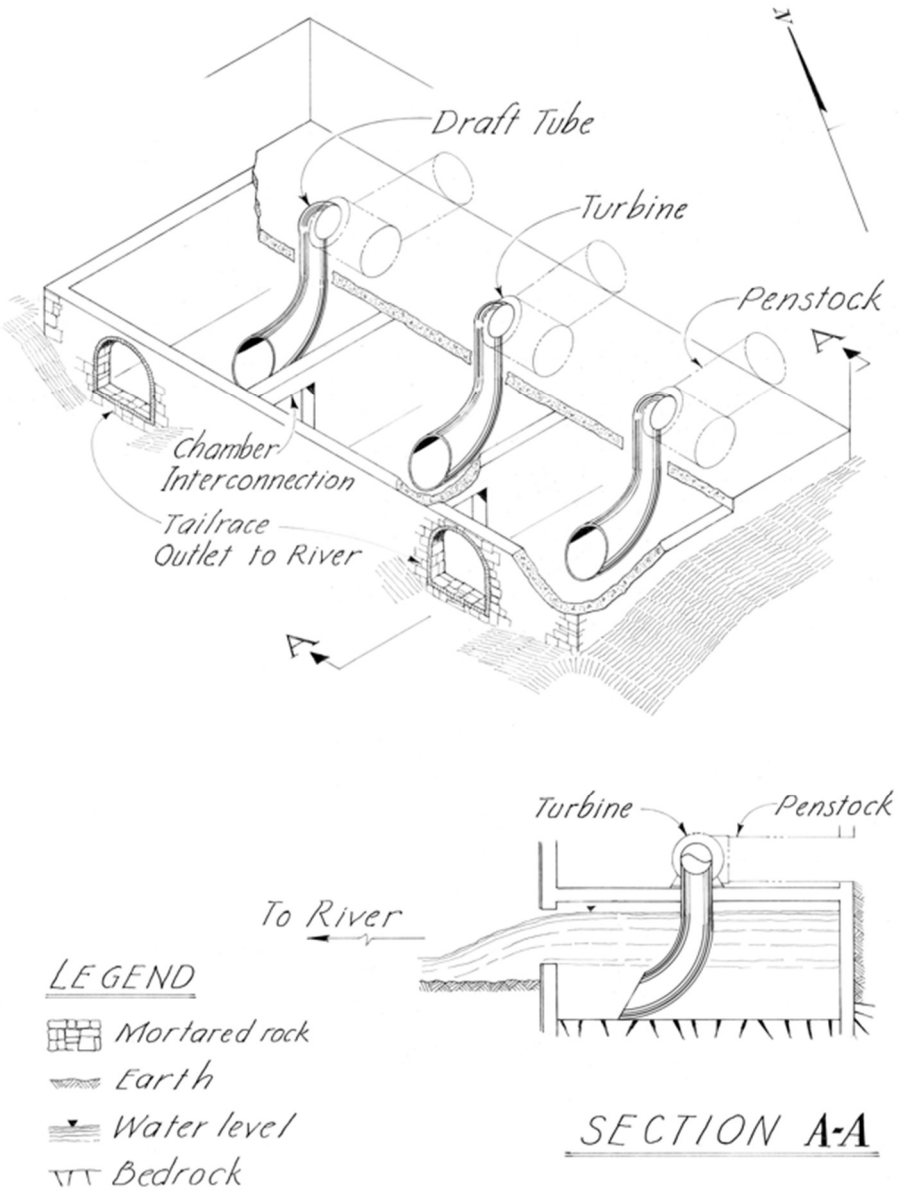


Figure 4.6.4 - Illustration of the Tail Race Chamber ─ The north/south spacing of the chamber walls and the existence of the interconnection between the middle and southern sections are uncertain. Remnants of the 1910 plans show an elbow draft tube in the south section. Elbows were speculated to be in the north and middle sections as well.

The chamber comprised three sections that were interconnected so that the center one communicated to both the north and probably to the south sections. This interconnection was required because only two arched openings existed. Weirs were installed at the arches to ensure the draft tubes remained submerged. On the outside of

the chamber the two tailraces were earthen channels that had rock inverts to prevent scouring as the water discharged back to the river. Figure 4.6.5 is a 2002 or earlier photo of the tailrace chamber (background) and lower forebay remnants. (foreground). Only the two draft tubes on the northern and middle sections were installed in 1906. The powerhouse and earthen tailraces are shown in Figure 4.6.6.

Figure 4.6.5 - Photo from 2002 or Earlier of the Remnants of the Tailrace Chamber and Lower Forebay Structure ─ The powerhouse walls, chamber walls and lower forebay structure discharge flume can be seen. This photo shows the condition of the powerhouse when Mr. David Prilliman purchased it. He demolished most of what shows above and performed earthwork, demolition, and other construction that obscured or destroyed most of the chamber and structure. (Courtesy of Desmond Kendrick, archivist)

Figure 4.6.6 - Earthen Tailraces ─ (White, 1933)

5. The 1910 Hydroelectric Facilities

In 1905, the town had anticipated a post-1906 expansion as is evident in their resolution to build across the Smith River a stone dam 15-ft high with a sufficient base to allow a seven-ft increase of the dam height without having to add thickness at its base. The need for an increase in power production capacity arose in 1909 to accommodate the Martinsville Cotton Mill. This industry became a major driving force for the 1910 and later expansions of the hydroelectric facilities. Figure 5.1 is a photo of this industry.

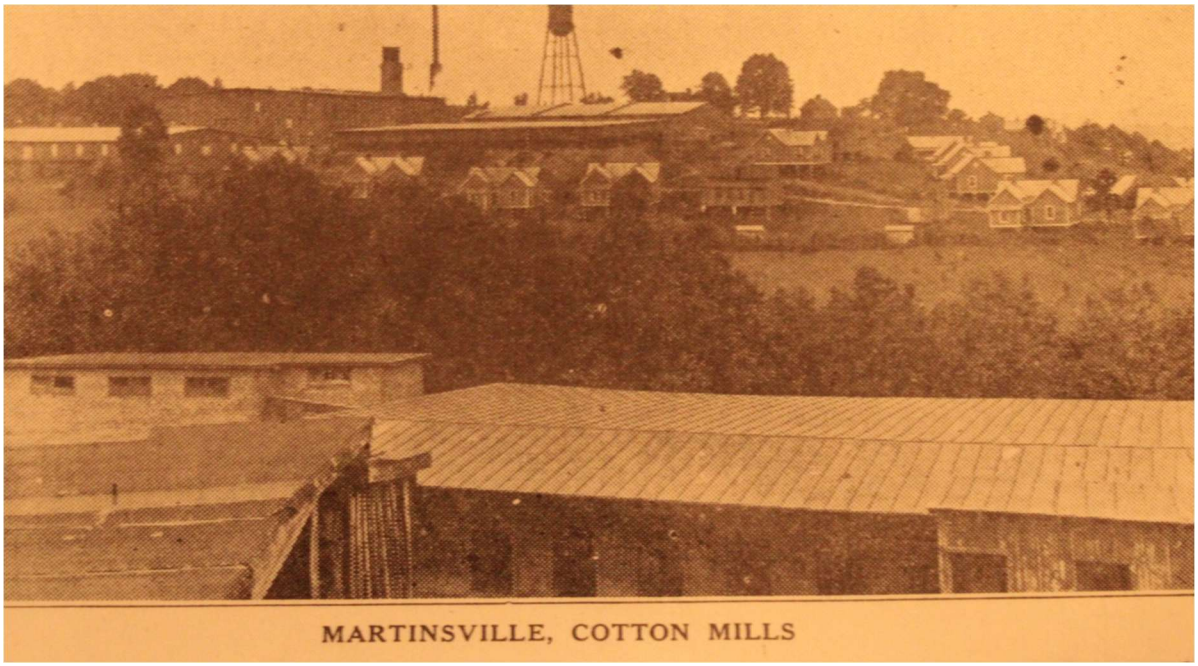


Figure 5.1 - Photograph of Martinsville Cotton Mills ─ This mill occupied the former Rucker & Whitten tobacco factory that was owned in part by Pannill Rucker. (Graveley Family Collection Courtesy of the Library of Virginia.

Each of the hydroelectric facilities was modified by raising their water-bearing components and by other improvements. C.P.E. Burgwgn Inc. was retained as consulting engineer to investigate the conditions with reference to the increased development of the power at the Smith River. Compensation was not to exceed $75 plus expenses. Rand & Tuggle was the contractor.

Council minutes tell that the 1910 powerhouse had a staff of three. W.H. Fontaine was the electrician and pump engineer who was paid $100 monthly; his duties also included work at the Jones Creek water pumping station. Mr. J.H. Pharis, Jr. and Mr. S.J. Carter were powerhouse engineers with monthly salaries of $75 and $60 respectively.

5.1 1910 Smith River Water Rights

An additional height of seven ft would increase the level of the pool behind the dam. To accommodate the greater area flooded, additional flooding rights had to be acquired. In 1909, Council and Mr. T.G. Burch negotiated for the compensation the town would pay to Burch for the greater flooding rights, but no agreement could be reached and the

parties agreed to arbitration which resulted in a payment of $800 to Burch. The minutes did not include any references regarding flooding rights along the south side of the river.

Also in 1909, Council directed a special committee to confer with the Chairman of the Henry County Board of Supervisors for permission to raise the bridge across the Smith River just below the dam. Photographs show that the bridge was not raised.

5.2 1910 Dam

To increase generation capacity, more water at a higher head would need to be delivered to the turbines. To accommodate the head and flow increases, the dam was raised by seven ft, and water levels at the powerhouse were also increased. The increase at the dam was accomplished by raising the upstream most of the five walls by almost seven feet .The four other walls were raised to accommodate a spillway slope of 45 degrees (Saville and Williamson, Inc., 1931). Additional rock rubble was placed between the walls. A rock-faced spillway was placed across them and extended to the river bed below probably because the resulting downstream slope was too steep for unmortared rock rubble. A result of the spillway addition was that the mid-span abutment drainage gates were sealed closed, and the hoist gate operators were removed. The river water levels above the dam could still have been regulated using the upper forebay inlets and drains.

During construction, disruptions to the water supply to the upper forebay were minimal because the dam would have been raised in sections along the upper forebay. Figure 5.2.1 is a photo of the 1910 spillway; note that no gate stem is visible and there was no discharge. Before 1930, a three-ft tall concrete cap was placed at the spillway crest ─ probably to accommodate a thickening of the upstream most wall. Even with the rock facing and new cap, the 1910 dam did not exceed the height limitation imposed in the Hairston deed.

Figure 5.2.1 - 1910 Rock-Faced Spillway ─ The south buttress and the southern mid-span opening are visible. (Gravely Family Collection Courtesy of the Library of Virginia)

5.3 1910 Upper Forebay Structure

Raising the upper forebay structure was a part of the 1910 modifications. Like the dam, each part of this structure, including the hoist gate stems, was raised no more than seven ft. To avoid inundating the approach to the covered bridge downstream, the overflow weir and the wall for the upper section of the raceway were not raised, and they were originally built to the 1910 level. Recall that the Council had inquired about raising the bridge in 1909. Disruptions of river water supply to the upper forebay were managed by construction sequencing (the order of the steps of the construction). Figure 4.3.1 above shows the 1910 modifications and Figure 5.3.1 and 5.3.2 shows the 2023 and 1988 vestiges of the modifications to this structure.

Figure 5.3.1 - Upper Forebay 1910 Modifications Viewed from the River ─ The drain openings, weir and weir wing wall can be seen. Note the dam as shown was modified after 1910 and the raceway wall was washed away in 1995. (Mariels, 2023)

Figure 5.3.2.-. Upper Forebay Before Shotcrete ─ Looking toward the river (Wiley & Wilson, 1988)

5.4 1910 Raceway

Figure 5.4.1 - Photo of the Eastern Wall of the1910 Powerhouse. ─ The new lift gate hoist, lower forebay overflow wall and raised powerhouse wall are seen. (Courtesy of Desmond Kendrick, archivist)

Relatively few changes were required for the raceway in 1910. The upper raceway wall was already at the maximum height due to the bridge limitations. A greater flow rate to the powerhouse would have been needed to increase electrical production. Except for

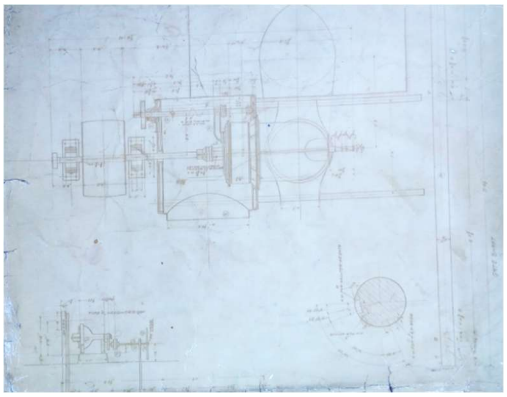
at the powerhouse, the raceway required no changes to accommodate a higher rate of flow. Here, the higher water level was accommodated by raising the earthen berm.

5.5 1910 Powerhouse

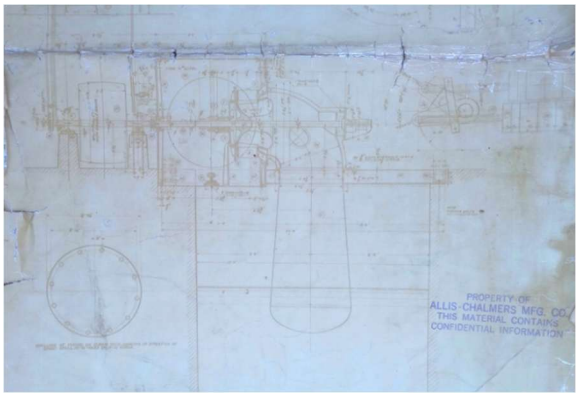
Many alterations were made to the powerhouse. To allow an increase in water level to the turbines, the wall along the eastern side of the powerhouse was raised. Disruptions to the water flow and the power production were avoided by sequencing and coordinating the raising of the wall and the powerhouse modifications. See Figure 4.5.1 for a view looking at the north side of the 1906 powerhouse exterior and Figure 5.5.1 for a view in 1910. The architectural changes were the elimination of a north wall window, relocation of the north wall door, and new roof penetrations, one of which was the air vent for the new penstock. The door was moved west because the slope of the higher new berm which likely had wooden steps leading to the gate hoists was too close to the old door.

Interior alterations were on all three levels of the powerhouse.

Figure 5.1.1 - The 1910 Powerhouse ─ The west side of the raceway berm and the tailraces can be seen. Note the relocated door on the north wall (White, 1933)



Plan



Elevation

Figure 5.5.2 - Remnants of the Plans for 1910 Powerhouse Showing a Plan and an Elevation of the New Turbine ─ These show pulleys for belts to the generator and Woodward governor (partial), and draft tube (Allis Chalmers, Inc.,1908)

5.5.1 Generator Floor

Here, the two existing 150-kW generators were replaced with 250-kW units, and a new 300-kW unit was added and belted to a new turbine. A new Woodward Type C governor with turbine to governor belts instead of a shafted connection was added. Figure 4.6.3 above shows the arrangement of the floors and the new equipment in the 1910 powerhouse.

5.5.2 Turbine Floor

The new S.Morgan Smith wheel was installed along with the belting to connect the turbine to the new generator and Woodward governor on the generator floor. The 1910 governor was a different model than the ones used in 1906. It was set with a belt instead of a shaft as used in 1906. A new steel 6.5-ft diameter penstock was attached to an existing wall sleeve and to the new turbine. Discharge from the horizontal shaft turbine was made through a new draft tube to the tailrace chamber. See Figure 4.6.4 above. Remnants of what are believed to be the plans prepared by. SMS, Co. were found. The engineer's name was redacted, and the plans were stamped, "Property of Allis Chalmers Manufacturing Company." Most of the new materials for the project were made by SMS, and one of the remnants included a parts list with this company's part-numbers. So, it is possible that Smith's Co., who was later acquired by Allis Chalmers, was C.P.E. Burgwgn Inc.'s sub-designer for the powerhouse work. Examples of these remnants are shown in Figure 5.5.2.

5.5.3 Tailrace Chamber

Except possibly for the new draft tube, no known changes were made to the tailrace chamber.

5.5.4 Lower Forebay in 1910

As had been done at the upper forebay structure, the walls and weirs related to the raceway water levels were raised. Figure 4.5.2 above identifies the lower forebay modifications. Figure 5.5.3 shows photos of the altered overflow and outlet weirs.

Figure 5.5.3 - Photos of 1910 Lower Forebay Outlet Structure ─ The powerhouse, outlet gate hoist, overflow weir, stilling pool and outlet weir are visible. (Courtesy of Desmond Kendrick, archivist)

5.5.5 Construction Sequencing

To avoid operational disruptions, carefully thought-out sequencing of the construction and installation of the improvements for the powerhouse and the lower forebay would

have been required. Since the Martinsville Cotton Mill was still operating with its own steam-powered dynamo, and because most of the other electrical demands were for lighting which occurred after sunset, the effects of daytime disruptions would have been minimal for residents and for street lighting. To facilitate installation of the improvements, coffer dams could have been constructed to allow dewatering of the lower forebay where the modifications were to have been installed. In Figure 5.4.1, two concrete walls extending into the forebay are visible. It is suspected that they were installed in the 1906 project possibly to accommodate future work.

5.6 1910 to 1932 Powerhouse

Martinsville continued to operate the powerhouse to provide all their power demands until 1927 when APCO began supplying power to the Martinsville Cotton Mill. Brian White's report spelled out the powerplant's obituary. Even after the town's grid was interconnected with APCO, generation continued until January,1932, except for December 27,1927 to March 6, 1928. (reasons unknown) This facility continued to breathe by staying operational until May 5,1932 when the new powerhouse was placed on-line. After 26 years, its last generation was for several days in March and April 1932 during a high river flow period. No information was found as to why the 1931 project and APCO could not handle the demand. The old raceway and powerhouse were abandoned in place. Parts of one governor, one turbine and the switchboard were relocated to the new powerhouse. Disposition of the remaining equipment from the powerhouse is unknown. According to Trout, the turbine casings (draft tubes?) are still in the tailrace chamber.

5.7 Vestiges in 2024

The city conveyed most of the Hairston conveyance around 1969 to multiple purchasers. In 1975, Philco Rentals Inc., Mr. David Prilliman President acquired most of the Hairston tract, including all the property on the west side of the Old Dye Plant Road from Rte.220 to the east end of the powerhouse site. The old building had fallen in and only some unknown portions of the mortared rock and concrete structure remained. Trees had taken over the site as depicted on Figure 4.6.5 above. Mr. Dave cleared off the vegetation and built the Peoples Save Station building. His renovation included demolition, grading, filling and repurposing the powerhouse remnants to a modern building. Today few remnants of the 1910 structure remain.

Mr. Dave or owners who had purchased parcels from him filled in the raceway downstream of Rte. 220. He used the eastern wall of the lower forebay structure as the wall for his vehicle maintenance level and as part of the foundation for his office level. He creatively repurposed some of the structure's walls as a retaining wall to support the earthen fill used for the People's Save Station's parking lot and to support steps from there to the station's service bays as shown in Figure 5.7.1. The remainder of the lower forebay structure was demolished and then filled with earth during conversion of the property. Mr. Dave made no use of the tailrace chamber beyond filling the tailraces to

the river. Remnants of the 1910 configuration can be seen today on the south end of the old powerhouse, the tops of the tailrace chamber outlets on the exterior western wall, and the walls inside the maintenance level.

His structure had a vehicle maintenance level (with a maintenance pit) where the turbine room had been and, where the generator room used to be, he constructed an upper level that held an office and loading docks. When visiting the site in 2023, the author fell into the maintenance pit ─ only his pride was injured.

Figure 5.7.1 - 2024 Remnants of the Lower Forebay Structure Overflow Weir (Mariels, 2023)

As of December 2024, the building is a custom motorcycle parts and service business. The new owner was somewhat aware of the building's history. When asked if he had investigated the area behind the arches, he said he had not because he had heard there were foxes abiding therein. He also indicated that the pit had been filled so no one could fall into it. ─ Good idea!

Turbine Level Repurposed to Vehicle Maintenance - Note the pit and mortared rock wall.
(Kendrick, 2023)

Vehicle Maintenance and Upper Levels - Note remnants of lower forebay outlet structure
(Kendrick, 2023)

Riverside - The dam and multi-arch bridge are visible (Kendrick,2023)

Arch opening to the tailrace chamber
(Kendrick, 2023)

Old Powerhouse in 1923 (Henry County Virginia GIS 174 Dye Plant Rd, 2024)

Figure 5.7.2 - Repurposed Old Powerhouse in 1923 Photographs

6. The 1931 Hydroelectric Facilities

As early as 1910, the town contemplated that the powerhouse ultimately would not have the capacity to generate all the electricity needed by Martinsville. The powerhouse could not be expanded beyond its 800-kW capacity (two 250-kW and one 300-kW units) because the head between the lower forebay's water and the turbines was limited by the elevation of the adjacent road and the tailwater that could be no lower than the elevation of the river.

The Council surely was aware that by 1913, the Martinsville Cotton Mill had added two steam-driven turbines and two 375-kW dynamos at its location. (Sanborn, 1913) Fortunately, APCO had made a connection to a substation for the Martinsville Cotton Mill in 1927, and Martinsville interconnected its electric grid through that site in October 1928, (White, 1933) the same year Martinsville became a city. (City of Martinsville, Virginia, n.d.). This interconnection would allow more growth, and the Council decided to keep the dam operational to reduce reliance on APCO. No other reasons why the city decided to upgrade their hydroelectric facilities were found.

The engineering firm of Saville and Williamson, Inc. of Richmond, Virginia was retained in August 1930 (three months after Pannill Rucker's death), to investigate options to upgrade the city's hydroelectric facilities. Saville and Williamson presented Council with two options, and scheme B was selected. No information was found on the other idea. Included in the upgrade were modifications to the dam, construction of a new powerhouse, including the installations of turbines, generators and switchgear. Council minutes suggest that this firm was also charged with reviewing and approving the turbine and electrical proposals, and it's logical that they were also responsible for coordinating the construction. Once this project was completed in 1932, the raceway and old powerhouse ceased operations and were abandoned in place. A part of the smaller turbine, part of its governor, and a portion of the switchboard were moved from the old site and reinstalled at the new powerhouse. (Bowles, Smith River Dam and Hydro-electric Plant, 2000)

MARTINSVILLE'S ELECTRIC PLANT IMPROVED SOON

Proposed Plan Will Increase Power Production Nearly Double of Present Plant In Use

Martinsville's municipal authorities plan extensive improvements in the city's municipal hydro-electric power plant on Smith river, south of the city, which when completed will make available for local consumption almost double the amount of electric current produced by the present plant. According to figures the cost of the improvement would be returned to the city in the course of a few years through increased revenues realized from this plant.

A dozen or more business men and citizens met jointly with members of the Light and Power and the Finance committees of the city council at the Municipal building Thursday evening for the purpose of considering the expediency of improving the city's power plant. At this meeting were Messrs. Lee Williamson and F. B. Scott of Richmond, representing Saville and Williamson, Inc., a Richmond engineering firm. The matter was discussed at some length based upon the report of the engineers and the report from the accounting department of the city relating to the increase of income to be derived from increased production of the plant in the improvement as ascertained by the engineers. No conclusion was arrived at and the matter was left open for further discussion.

The reports indicated that the proposed improvement, at a cost of approximately $110,000, would add to the annual production capacity of the plant of about three million kilowatt hours and upon a sale of practically the full capacity of the plant as improved would result in an additional net income from the plant of about $30,000 annually.

The present production of electric power is 3,300,000 kilowatt hours. When the improvement is completed 6,300,000 kilowatt hours would be available, or almost doubling the present production of the plant.

The proposed plan provides for the construction of a new power house immediately adjacent to the dam, and containing practically all new machinery. The head of the dam will also be increased by 6 feet, by what is known as crest gates 6 feet in height constructed on top of the present dam.

(Bulletin, February 10, 1931 Power Plant Improved Soon)

VOL. 42, NO. 48

COUNCIL ORDERS NEW POWER PLANT PROJECT STARTED

Work Will Start On Martinsville's New Hydro-Electric Plant; To Cost Nearly Hundred Thousand

RICHMOND FIRM IN CHARGE

Project When Completed Will Double Present Capacity of Electrical Current For Local Use

Members of City Council of Martinsbille have held two important meetings during the past ten days, the regular monthly meeting of last Tuesday and a called meeting Monday afternoon, both sessions being held in the council chamber at city hall.

The following matters were taken up and given the necessary attention: The superintendent of streets was instructed to purchase a carload of oil for surface-treating Mulberry street east of Rives road and for Spruce street, between Rives road and Mulberry road.

Council completed its preliminary plans for work of improving the Smith river power plant, providing for an increase of the capacity of the plant by the erection of crest gates six feet in height on top of the present dam, and by constructing a new power house, to be located immediately below or adjoining the dam. It has not been determined by the engineering firm in charge of the work, Saville and Williamson, Inc., of Richmond, whether the power house should be located on the north or south side of the river. Certain matters involving backwater rights and other easements on both sides of the river near the dam were adjusted by agreements between the city and A. L. Tuggle and T. C. Matthews, property owners.

A contract between the city and the engineering firm was executed and proposals by the General Electric company and the S. Morgan Smith Co. for new electrical and water power machinery for the power house were approved, subject to checking up and approval of the engineering firm.

The matter of proposals and contracts for other equipment and construction work including crest gates were referred to the engineers who were authorized to make negotiations on behalf of the city in those matters, these matters of proposals and contracts to be submitted to council for its approval.

A motion was made calling on the local gas concern to complete restoration of condition of sidewalks which were disturbed by excavations made by the company in constructing its lines.

Several motions and orders were entered during the sessions of council which will be found in other sections of the Bulletin.

AUTO ACCIDENT | Kiwanis Meeting

(Bulletin, June 1931 Council Orders New Power Plant, 1931)

Figure 6.1 - Henry Bulletin Articles — 1931

Figure 6.2 - Martinsville Hydroelectric Plant circa 1932 (White, 1933)

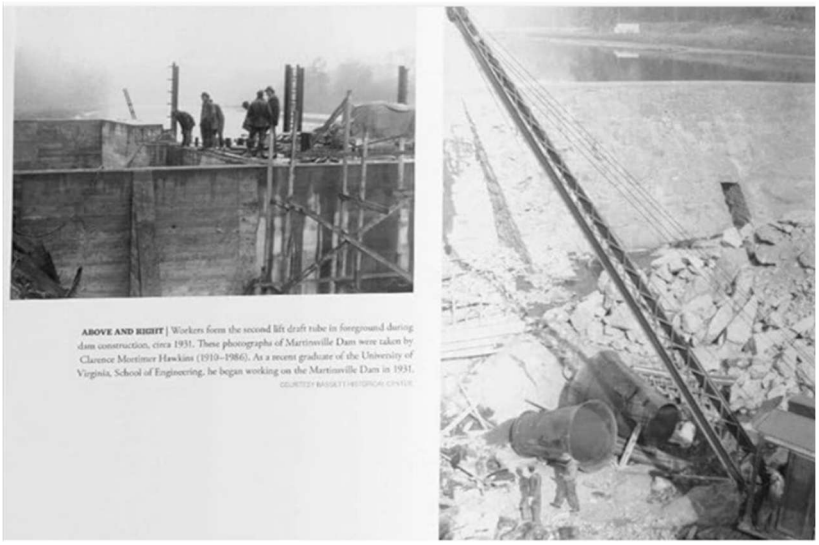
6.1 Land and Water Rights for the1931 Dam

Although the dam was not going to be raised, Saville and Williamson proposed to add 14 steel crest gates six-ft tall that could increase the river level by at least six ft to 696 ft MSL at the dam. With the gates closed and with higher river flows, the height increases would have been greater. Prior to 1922, the town had acquired land on the north side of the river from A.L. Tuggle to accommodate what was then believed to be the greatest increase in dam height practicable. In 1922, Tuggle appeared before Council to request the town relinquish their flooding rights to this land. After an investigation by the Town Engineer, Council agreed and an arrangement for exchanges in flooding rights was agreed upon. The exchanges included land once owned by Pannill Rucker. The city, in spring 1931, started the process of acquiring flooding easements from John L. Wray and Frank Finney, and additional rights from A.L and K.W. Tuggle. An agreement was reached with the former, but the Wray and Finney matter went to arbitration before the city acquired the easement. The city also made an agreement with T.C. and I.C. Matthews to exchange properties, rights, and easements on the south side of the river and upstream of the 1927 State Highway bridge.

6.2 1931 Dam

Fourteen sets of concrete piers, steel crest gates with 696-ft MSL tops, hand operated mechanical gate operators, a walkway spanning the entire dam, and wooden

flashboards for an emergency spillway at the north bank were added. Finally, modifications for discontinuing the use of the forebay and raceway were made. Only remnants of Saville and Williamson's plans for the dam improvements were found. Construction phase photographs are shown in Figure 6.2.1. Figures 6.2.2 through 6.2.4 show some of the 1931 modifications in more recent times.



Construction Near the Powerhouse — Conical Draft Tubes
(Photographs by Clarence Mortimer Hawkins Courtesy Bassett Historical Society)

Crest of Dam - Note the old raceway wall and raceway berm can still be seen. The vertical rebars were for the 14 piers.

Figure 6.2.1 - Construction Phase Photographs of 1931 Dam (Martinsville Bulletin, 2019)

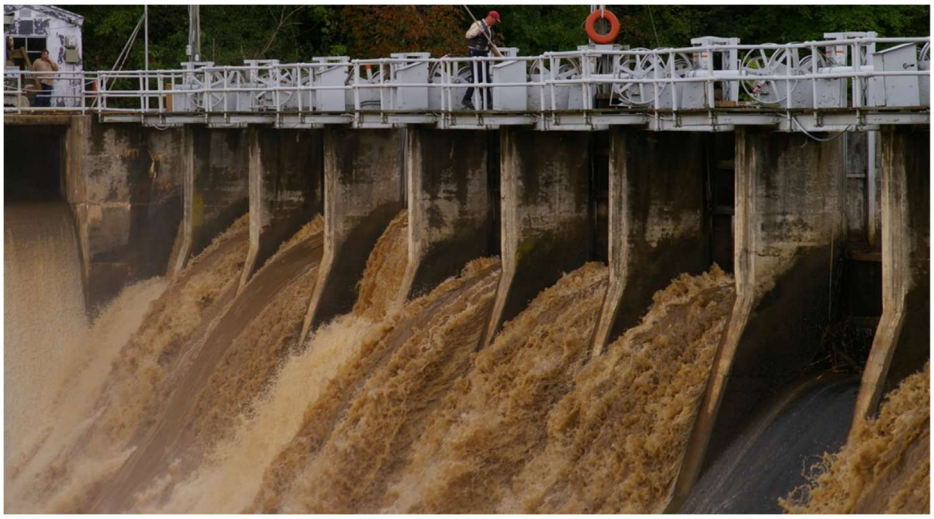


Figure 6.2.2 - 1931 Dam Modifications with High Water ─ The operator on the walkway is cleaning floating debris from the crest gates. Debris is a chronic problem. Note that not all gates are open, and that water is flowing over the auxiliary spillway on the left (Williams, 2024)

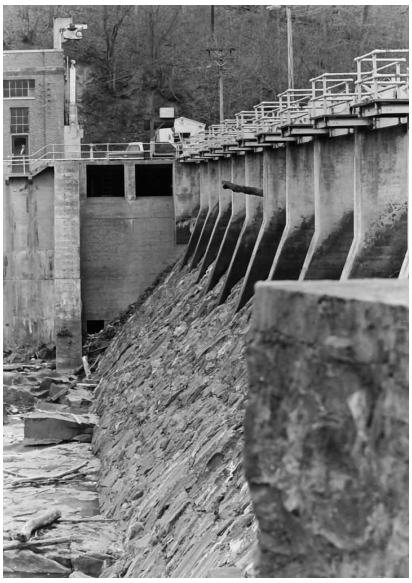


Figure 6.6.3 - 1931 Dam Modifications in 1972 ─ Note rock-faced spillway and debris at the crest gate. (Slaydon,1972)

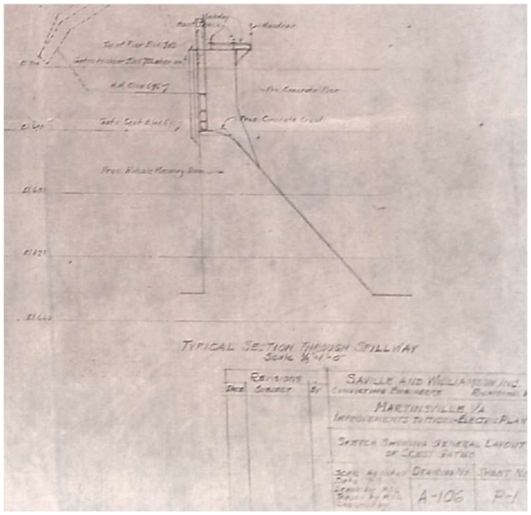


Figure 6.2.4 - Portion of Elevation Drawing by Saville and Williamson, Inc. (Kendrick 1923)

6.3 1931 Upper Forebay and Raceway

The upper forebay was incorporated inside the new powerhouse at the dam, so no need for a raceway existed. The old upper forebay, forebay structure and raceway for the earlier facilities were abandoned in place. In later years, the forebay and raceway were filled in or mostly obscured. Vestiges of the upper forebay structure still stand.

6.4 1931 Powerhouse

The current edition of the powerhouse was completed in 1931. It includes the same components as the 1906 and 1910 projects, except the components are all in one place. Another similarity is that few portions of the plans and specifications were retained by the city, and that the design engineers were no longer in business.

The research found a few remnants of the structural plans by the Virginia Steel Company; generator plans by General Electric; governor plans by the Woodford Governor Company; and plans and specifications for the trash racks, head gates, and turbines by SMS.

An illustration of the powerhouse is shown in Figure 6.4.1 as an exploded view with components numbered for identification. A table with the identified parts follows the illustration. The reader is advised to refer to this illustration frequently. A picture by Mr. Keller is indeed worth a thousand words.

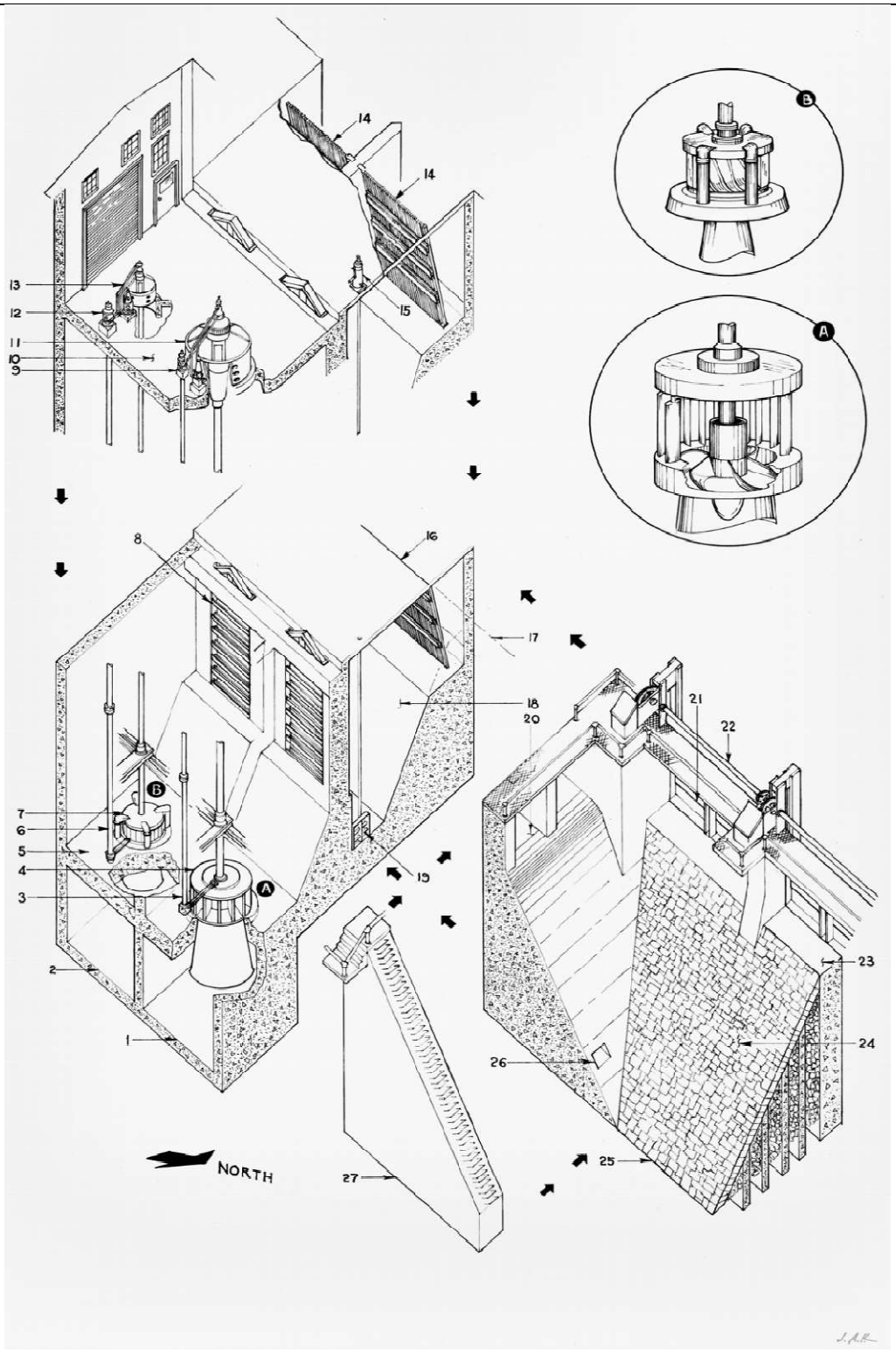


Figure 6.4.1. - Exploded View Illustration of 1931 Powerhouse — An identification of the numbered components is given in the table below.

Table of the Components in Figure 4.4.1	
Number	Description of Component
1	Tail Race for the Kaplan Turbine, Invert at 656 ft MSL, Tail Water at 664-ft MSL
2	Tail Race for the Francis Turbine, Invert at 656 ft MSL, Tail Water at 664-ft MSL
3	Shaft for the Wicket Gate Adjustment as Shown on SMS's 1931 Plans.
4 and A	Kaplan Turbine
5	Turbine Floor ─ Elevation 670 ft MSL
6	Shaft for the Wicket Gate Adjustment on Francis Turbine
7 and B	Francis Turbine
8	Head Gates (for separating the initial from the final forebay and that allow isolation of each turbine subsection)
9	Governor for the Kaplan Turbine
10	Generator Operating Floor ─ Elevation 701 ft MSL
11	1000-kW Generator
12	Governor for the Francis Turbine
13	300-kW Generator (Council minutes say 375 kVA)
14	Trash Racks
15	Drain Gate Operator on the East Side Operating Platform
16	Operating Platform on the East Side of the Powerhouse ─ Elevation 703 ft MSL
17	Line Indicating the 696-ft MSL Elevation of the Top of the Crest Gates
18	Initial Forebay
19	Initial Forebay Drain Gate
20	Auxiliary Spillway Crest ─ Elevation 696 ft MSL
21	Steel Crest Gates also called Flood Gates ─ Top Elevation 696 ft MSL
22	Crest Gate Operating Mechanism
23	Dam Crest ─ Elevation 690 ft MSL
24	Dam with Five Wall Interior and Rock-faced Spillway
25	Toe of the Dam ─ Elevation 665 ft MSL +/-
26	Initial Forebay Drain Channel Through the Auxiliary Spillway
27	Buttress for North Powerhouse Wall

All in one structure, this powerhouse contained the generator level with its operating platform, initial forebay and its auxiliary spillway, final forebay including the turbine level, and the tailrace. Figure 6.4.2 is a photograph of the north face annotated to show the three sections. Figure 6.4.3 depicts the east face of the powerhouse.

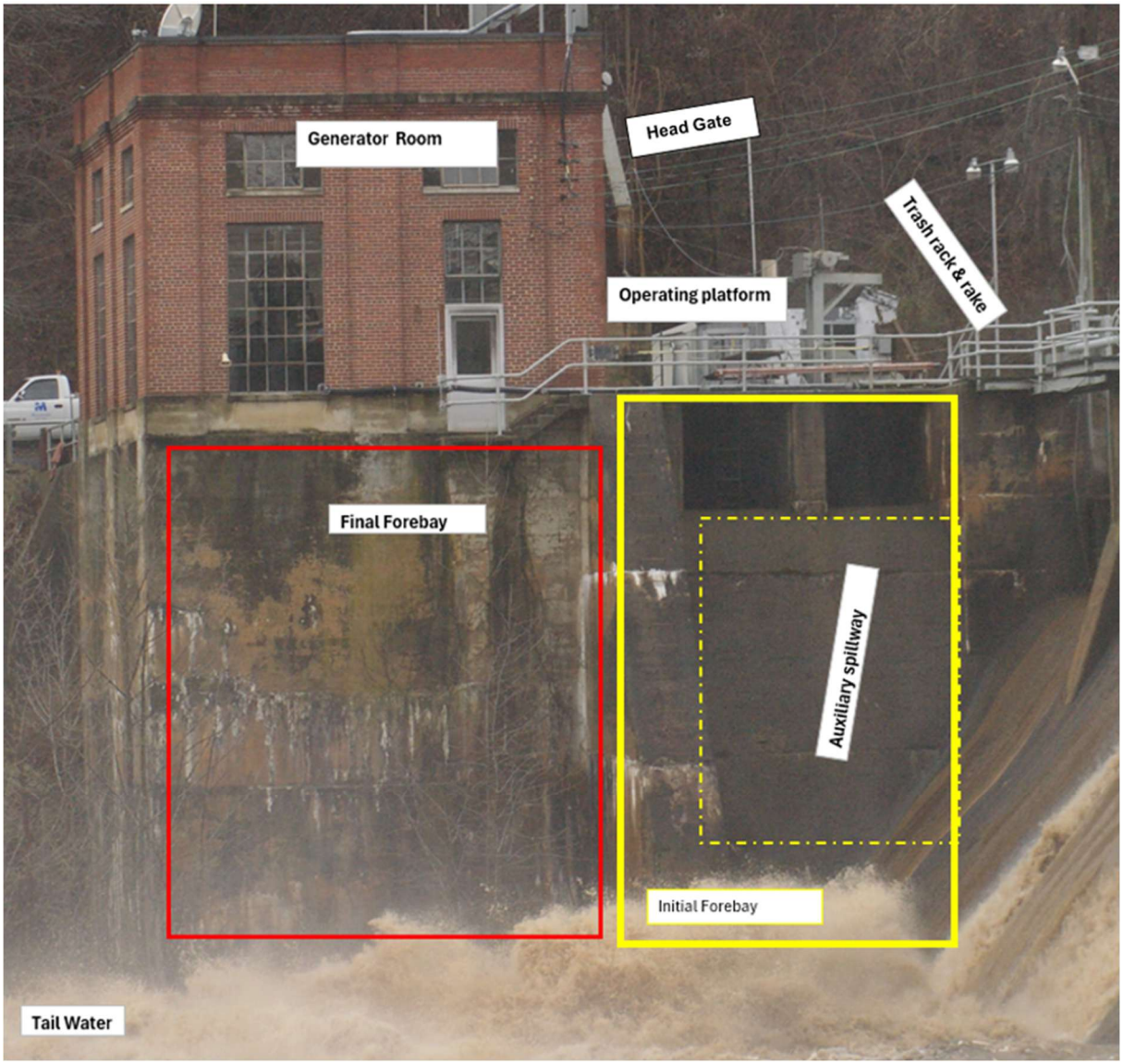


Figure 6.4.2 - Annotated Photograph of the Three Section 1931 Powerhouse (Adams, 2024)

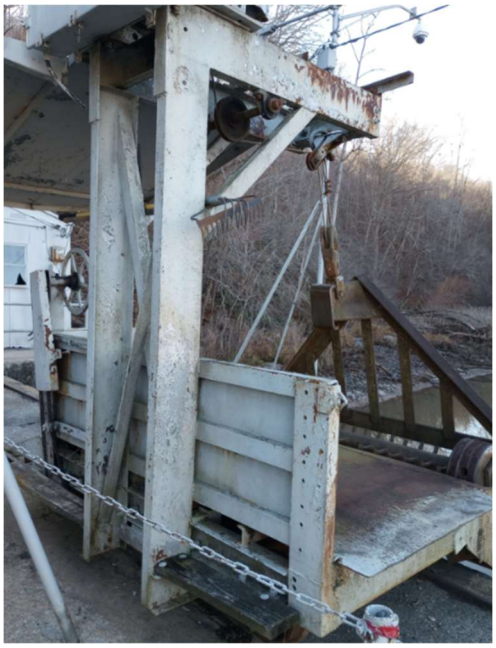
Figure 6.4.3 - East Face of 1931 Powerhouse (Adams, 2024)

6.4.1 1931 Initial Forebay

Water from the river passed through two 15-ft wide trash racks that were cleaned with mechanical rakes. Debris was placed on a Leonard mobile trash cart that could be moved to each rack. Both vertically slanted trash racks were set at 701 to 685 ft MSL top to bottom. Immediately upstream of and flanking each rack were two columns with steel channels that also ran from 701 to 685 ft MSL. (The dam crest and new crest gates were at 690 and 696 ft MSL respectively.) These channels were wide enough to accept the forebay head gates, but experience showed there was no intention for them to be relocated there. Bowles speculated that if the channels upstream of the trash racks were to hold gates to isolate individual racks, that wooden gates or stop-logs installed with a mobile crane were intended. Water elevation in the initial forebay was limited to the crest gate elevation of 696 ft MSL by two weirs that discharged to the auxiliary spillway. A drain gate allowed draining of the initial section for inspection and sediment removal. Two steel head gates, 7.5-ft wide and 16.5-ft tall, raised and lowered with a fixed crane, separated the initial forebays from the final sections. Figure 6.4.4 provides photos of the current operating platform outside of the initial section.

Leonard, a product of SMS, Trash Cart with No Attachments ─ The gentleman in profile is Mr. Barry Jones and the other is Mr. Tim Agee, plant operator. (Kendrick, 2023)

Fixed Crane with Northern Interior Head Gate Raised and Overflowing Auxiliary Spillway. (Adams, 2024)



Trash Cart with Rake (Kendrick, 2023)

Figure 6.4.4 - Photographs of the Current Initial Forebay Operating Platform

6.4.2 1931 Final Forebay

A concrete separation wall (south to north) separated the final from the initial forebay. In the SMS specifications, (S.Morgan Smith Co., Specification -May 1931) the final forebay is called the flume. A center concrete wall (west to east) within the final forebay divided it into south and north subsections which could be isolated from the initial forebay with the two head gates. The wheel and wickets from the largest Francis turbine in the old powerhouse were relocated to the south subsection, and a new Kaplan turbine was installed in the other. SMS's specifications called for a 16.5-ft tall gate for the Kaplan

and a 10.5-ft tall gate for the Francis – both with filling gates. But the installed gates differed from the specifications as they were the same size and had no filling gates. (Bowles, Email to Thomas Slaydon August 21, 2024) It is speculated that both gates were made the same size to allow for interchangeability, and that no filling gates were provided because the electric crane had ample lifting power to overcome the water pressure and to save costs. In the 1906/1910 powerhouse, the gates to the penstocks were operated by manpower so filling gates were needed.

6.4.3 1931 Turbines and Tailraces

Two turbines were installed in the final forebay. A Francis that spun the 300-kW generator was in the south subsection and a new Kaplan for the 1,000-kW generator was in the north one. SMS, who provided many of the components at the old powerhouse, provided the design and installation of their equipment in 1931.

The largest Francis turbine's wheel and wickets with its Woodford Type C governor from the old powerhouse were adapted and reused at the 1931 powerhouse. (Bowles, Smith River Dam and Hydro-electric Plant, 2000) The relocated turbine's runner remained in use until the 1980s. Figure 6.4.5 below shows the Francis on the drawing's right side.

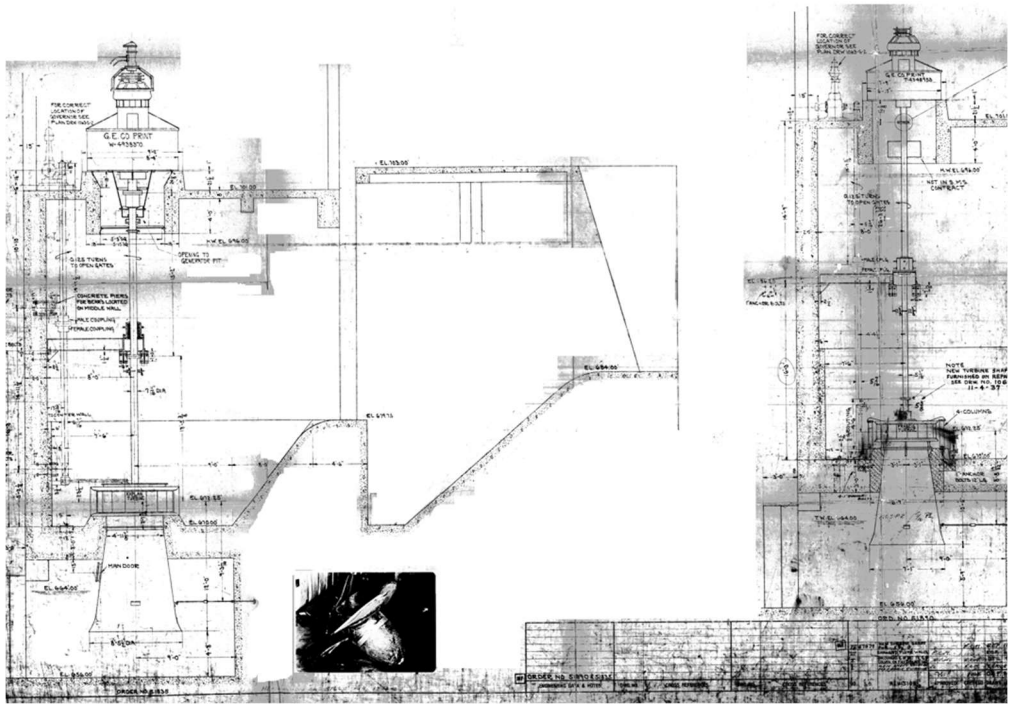


Figure 6.4.5 - Remnants of SMS Plans for the Turbines and Generators (S. Morgan Smith Co., 1931) ─ Compare the Francis to Figure 5.5.2 above. Note: These are two separate views at each turbine.

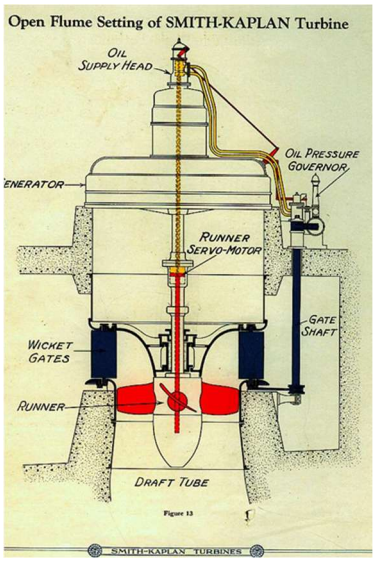


Figure 6.4.6 Typical Kaplan Turbine Installation (Smith S. M., 2017)

The north side held a Kaplan in which the runners are like propellers. This Kaplan had variable pitched blades. Kaplans also included a wicket gates assembly. The governor, located with the 1,000-kW generator, controlled both the openings of the wicket gates and the pitch on the turbine blades. A mechanical system turned the wickets, while a hydraulic system adjusted the pitch of the blades. The specifications for the relocated Francis turbine were found, but only incomplete plans and specifications were found for the Kaplan.

Both turbines were connected to draft tubes that discharged into a tailrace that flowed to the river as shown in Figure 6.4.7, and both turbines and draft tubes are still in use.

Bowles related the story that while on the city's line-crew, he and a partner rowed a boat into the tailrace to inspect the Kaplan's blades and draft tube. Their confidence in the head gates was strong!

Figure 6.4.7 - Tailrace Openings (Slaydon, 1972)

6.4.4 1931 Generator Floor

Above the final forebay, the generator room contained the generators, electrical switch gear, governors, and the operators' work area. The generator on the north side was rated for 1,000 kW, and the south side one was rated for 300 kW (375kVA in Council

minutes). It was not relocated from the old powerhouse. These generators and governors were in use in 2024. Figure 6.4.8 consists of 2023 photographs of the generator room. Access to and from the operating platforms and the road to the powerhouse was on this floor. The engineer's recommendation was to retain the 300 - kW size instead of increasing it which would have required a new turbine. Bowles later said the 300 kW was a good sizing because river flow was usually available, but flow would not be as reliable for greater power capacities.

300-kW/375-kVA Generator and Governor

Governor Dial brought from 1910 Powerhouse

1,000-kW Generator

Switchgear

Figure 6.4.8 - Photographs from Inside of the Generator Room (Kendrick, 2023)

6.5 1931 Dam Construction Sequence

The power demand in 1931 was greater than in the 1906/1910 era. Fortunately, Martinsville had an interconnection with APCO at the substation at the Martinsville Cotton Mill. Power production data in Mr. White's 1933 report show that the substation could support the total city demand. This meant that the city's contractors for the 1931 project could take the dam and the old powerhouse out of service while the new plant was being constructed. Of course, Parrott, the general contractor, would still have to contend with the Smith River.

Using United States Geological Survey's (USGS) data, White's report and Council minutes, Figure 6.5.1 was developed to outline a possible timeframe for the coordination among the old plant, the new 1931 plant and APCO. Mean daily flows in the Smith River were included to reflect the flows Parrott faced.

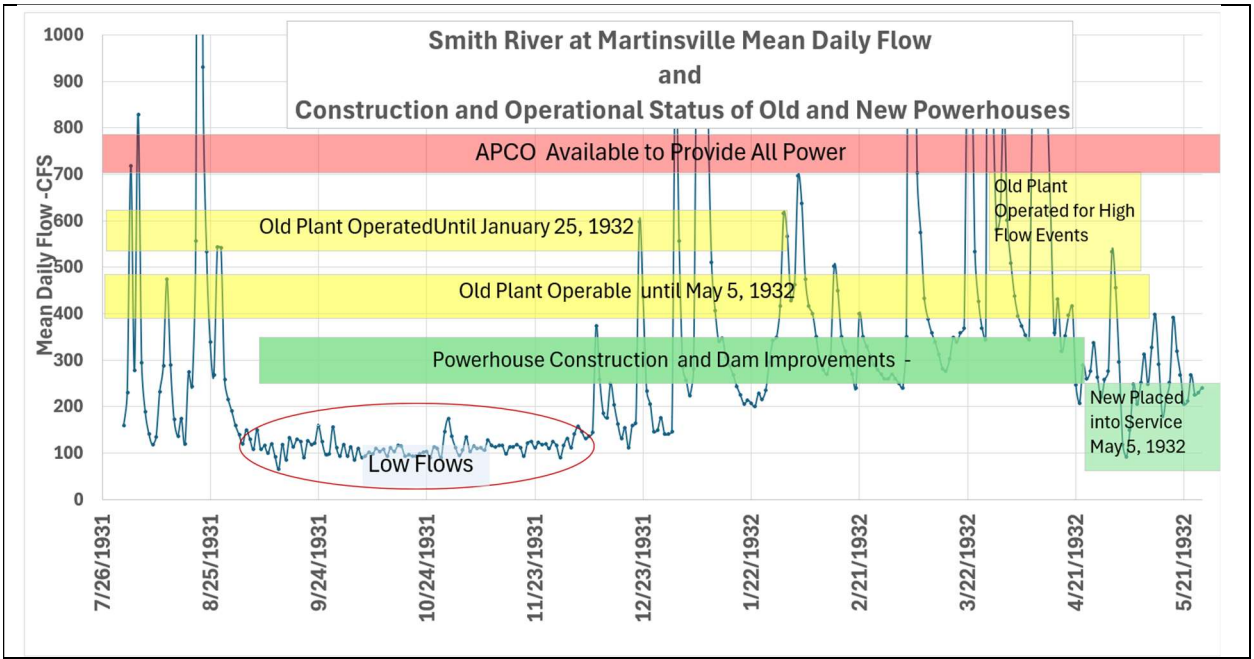


Figure 6.5.1 - Coordination of Electrical Production during the 1931 Power Plant Expansion.

Construction of the 1931 improvements began after the proposals for the work were opened in late August 1931 and the powerhouse became operational only five months later, on January 25,1932! The USGS flow data above show that luckily for Parrott, the river flow was low during portion of the construction period. During the low flow period, the coffer dam for the powerhouse construction could have been smaller and the work could have progressed more rapidly. In Figure 6.2.1, the draft tube photograph shows low flows, while the dam crest photograph shows higher ones. Once the powerhouse was completed, it could have been tested between January and April before electrical production started. In February and most of March, APCO provided all the city's power. The old powerhouse remained operational until April 1932, and its last uses were during high flow events in March and April. During the entire construction period, the city could have relied on APCO for all its needs ─ a harbinger of today's electrical power sources for Martinsville.


ENRY BULLETIN

MARTINSVILLE, VA., FRIDAY, MAY 6, 1932

Planning to Map the Antarctic Wastes

Martinsville's Improved Hydro-Electric Power Plant Put Into OperationTo-Day

New Crest Gates Are Lowered Wednesday and Dam Slowly Fills Up Channel Six Feet Above Present Water Level

Will Fill Soon Treasurer Post

Figure 6.5.2 - Henry Bulletin's Headline on 1931 Powerplant (Bulletin, Martinsville's Improved Hydro-Electric Power Plant,1932)

7. Modifications after 1931

After 1931 the only modifications that have been identified are given below. Only one of the physical changes altered the capacity of any of the facilities. They were mostly repairs, replacements, or protection of the existing infrastructure.

- VDH filled the raceway as part of their 1956 project to add the Rte. 220 north bound lanes.
- Repairs and minor modifications were implemented as recommended in a 1988 Wiley and Wilson report. (Wiley & Wilson, 1988) including:
    - Wooden flashboards on the ungated emergency spillway at the north end of the dam were replaced with permanent concrete blocks with a top elevation of 697.5 ft MSL.
    - The upper forebay drains were sealed.
    - Remnants of the forebay wall beyond the wingwall were demolished on their eastern end.
    - The remaining upper forebay was filled with earth.
    - The emergency spillway, at its discharge to the river, was armored with concrete paving.

- The following modifications described in Dennis Bowles 2000 report (Bowles, 2000) were made:

    - The 300-kW generator was modified to a 450-kW unit as part of a repair in 1987.
    - A Supervisory Control and Data Acquisition system that would allow the powerhouse to be monitored and operated remotely was installed in 1989.
    - The spillway was covered with shotcrete (a sprayable concrete), and grout was injected into the dam to seal leaks in 1994.
    - A redesigned emergency overflow spillway of grouted riprap was installed in 1996 after flows severely damaged the spillway and washed away the western end of the old raceway.
    - The wooden pole diversion boom (a floating barrier to keep surface debris from the powerhouse) was replaced with a modern boom.

Significant strategic changes in how the city obtains electric power have been made. According to a March 2011 presentation to Council called *Timeline for City of Martinsville ("City") Membership in Municipal Power, Inc ("AMP") and Participation in AMP Projects* (AMP, Inc, 2011), the city in 1998 contracted with Cinergy Corporation, another supplier of electric power, thus ending its association with APCO that began with the 1927 interconnection. The Cinergy contract ran from 1998 until 2005. Since then, the city has obtained most of its electrical power from AMP, a worldwide provider of power. Currently the city generates less than one percent of its power needs with the power station and an energy recovery system at the city's landfill. (Joyce, 2024)

8. Future?

What does the future hold for the city's hydroelectric facilities? Three options exist for the immediate future:

- Keep the dam and continue to generate power locally
- Keep the dam and cease local generation.
- Remove the dam and cease local generation.

Whatever option is selected, 99 percent or more of the power will continue to be purchased. To what extent local generation will continue will primarily be economically driven unless the need for renewable energy grows substantially or is mandated. Whether to keep the dam will be driven by a cost-benefits analysis and other factors. To decide the future of the dam, the forces encouraging its removal must be evaluated against the forces for retention.

The forces encouraging the facilities to cease being used can be any combination of structural, environmental, regulatory, or economic factors. Catastrophic impacts are

possible due to extreme hydrologic, significant seismic events, or malevolent acts. Changes in dam safety or environmental regulations could force the city to face massive expenditures to achieve regulatory compliance.

The structural integrity of the dam has been declared to be adequate. Regular inspections of the dam are required by the Virginia Department of Conservation and Recreation, and the latest one was submitted in October 2022. See Appendix 6. Because of high flows, the spillway could not be seen, so the results from a 2019 inspection were reported in the 2022 report. Neither the 1979 U.S. Army Corps of Engineers Phase I Inspection Report in Appendix 8 nor the 2022 inspection report indicated structural problems on the dam beyond the spalling of the shotcete lining of the spillway and minor maintenance needs. The dam was declared to be in fair condition which DCR defines as,

> *"No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action."* (Mattern and Craig, Inc., 2022)

Conditions of the upstream face cannot be addressed in this report as no results of investigations of the front face of the dam or of internal conditions have been found. Only time will tell if catastrophic failure or when deteriorating conditions too expensive to repair will occur.

Sedimentation exists at all dams. No report that was read indicated that sedimentation will hinder the generation of power to the extent that the facility has failed or is about to fail by becoming unusable. Excessive sedimentation at the dam and in the river's channel immediately upstream may become a greater problem if it has not reached its equilibrium. Bowles stated that "*Back in the late 1980's or early 90's the city hired a diver to inspect the upstream face of the dam and to measure the silt accumulation at the dam. The diver located the south end mid-span gate opening and swam into the drain opening until he was blocked by silt accumulation. The north mid-span drain was unattainable due to excessive silt accumulation."* (Bowles, Email to Thomas Slaydon August 21, 2024) Routine opening of the crest gates as currently practiced should limit sedimentation along the gated spillway sections, and a program of managing flows through the powerhouse chambers could help limit sediment problems in and around the powerhouse.

Environmental forces include objections of the dam's just being where it is. Some people object to dams due to a dislike for man's intrusion into nature, and the adverse ecological or hydrologic effects dams can cause. No objections of this sort have surfaced for the dam. Another significant force would be the potential dangers posed downstream to people, property, and infrastructure. Martinsville's dam is classified as a high hazard dam because these potentials exist. As the dam ages, fear and the ramifications of a dam failure could grow with more development of downstream lands.

New regulations promulgated by the state and federal governments could increase the city's burden for operating and maintaining the dam. New dam safety regulations, water flow rate requirements, or wildlife and water quality protection mandates could add expense and limitations to Martinsville.

Conversely, there are forces encouraging the retention of the dam. Historic preservation requirements and local nostalgia could encourage preservation of some or all of the structure. If the dam is removed, a major problem with handling the accumulated sediment behind the dam would have to be solved. The well-known trout fishery may encourage dam preservation to help regulate water temperature and flow near the dam. A robust canoeing and kayaking program exists in the river and the loss of the dam would eliminate the opportunity for 2.2 miles of flat-water use. With fossil fuel falling out of favor as an energy source, maintaining hydropower, a renewable source, will appear more attractive especially if Federal grants will fund modernization and operations. In fact, climate change may force continued use of this renewable power source.

Catastrophic failure notwithstanding, in the long run, economics will prevail. The dam, like all infrastructure, will reach the end of its useful life because the operations and maintenance costs will exceed the value of power produced and other benefits.

The city has contractual obligations for how it purchases power that may tend to confound predictions of future costs. As of this writing, Martinsville obtains its electric power with market purchases all at varying costs and with subscriptions or shares in a power corporation that obtains power from several sources. The claimed benefit of these subscriptions is that power costs are more stable.

The city's fiscal year ending June 30, 2025 (FY25) adopted operating budget for electric power generation is $18,708,119 of which $18,500,000 (98.9%) is for purchased power and the remaining $208,119 (1.1 percent) is allocated for local generation that includes costs for the hydropower and landfill energy recovery facilities. (City of Martinsville, VA, 2024) According to the Electric Department Director, Durwin Joyce, the projected FY25 electric power demand will be 165,179-mWh, of which less than one percent will be generated locally.

Based on Martinsville's history of aggressively pursuing electric power opportunities, it is certain that they will follow in Pannill Rucker's foot steps to pursue new technologies and approaches to maximize the value of their electric enterprise. Mr. Joyce and Mr. Bowles have both stated that the river's flow rate is the major factor limiting the city's ability to generate at the dam. It is not known what opportunities exist for coordination of the city's power production with water releases from Philpott Dam, a U.S. Army Corps of Engineers multipurpose project about twenty river miles upstream.

It is expected that the Electric Department will periodically pursue opportunities and evaluate the wisdom of continuing hydropower operations and the disposition of the dam. Their findings and recommendations will then be presented to the Council, who will gauge the feelings of the citizens and see who gives a dam.

9. Summary

Around 1900, the Martinsville Town Council, led by Pannill Rucker, decided to provide the town with electrical power to promote economic development and to provide its citizens with the benefits of electricity. Hydropower was selected over steam generation, and the town purchased land along the banks of the Smith River near the Old Greensboro Road. A rock rubble dam, raceway, and powerhouse were constructed and became operational in 1906. The generating capacity at the powerhouse was increased twice by the mid-1920s and an interconnection with APCO was made in 1927. The raceway and powerhouse were operated until 1932 when modifications, including a new powerhouse, were completed. This hydroelectric plant continues to operate today and is providing peak demands. In 1998, the city began to purchase its power from several suppliers other than APCO. The useful life of the hydropower plant is, like all of man's creations, finite. Today the dam is rated to be in fair condition. Its future will be determined by the benefits and costs of the operation and maintenance of the facilities.

(Rucker Family Society Newsletter, 2009)

Epilogue

As of October 2024, the dam and power plant are operating. I ponder how long the benefits of the Smith River plant's generation will justify its existence. This dam, like most public infrastructure, is a deteriorating asset suffering from deferred maintenance, yet a wonderful monument to those operating it, the town Council's foresight, the awesome engineering that accommodated rapid changes and future demands, and to the elegance of the construction of that era.

We find 1906 and 1910 rock and masonry construction still visible and in use in the dam's structure. Our eyes behold equipment from 1910 that remains in a 1931 powerhouse. Martinsville's Town Council's 1906 dream lives on at the dam and their vison sings with the hum of the power

I was blessed to learn more about the history of my home town, and to make new friends who helped me so much. I was given a fresh opportunity to apply the hydraulic and water resources knowledge I have obtained in my career. My sincere wish is that the dam's history will not be forgotten but will be enjoyed by historians and used as a reference by engineers and hydro-history enthusiasts. Alas, I never found the troll.

—End—

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Definitions

The definitions given below are in the context of Martinsville's facilities and they may not apply to other instances.

Electrical Terms	
Three-Phase Power	A form of alternating current electricity used to power equipment such as large motors
Arc Light	A gas-filled lighting fixture in which light is emitted by electricity arcing between two electrodes
Candlepower	An obsolete unit of measure for light output
Grid	The system of wires and transformers and other equipment that provides electric service to an area
Horsepower (hp)	A unit of measurement of the rate of mechanical power produced or required per unit time — One horsepower = 0.746 kilowatts (kW)
kVA	A unit of measurement of the rate of actual electrical power delivered to a system per unit time
Kilowatt (kW)	A unit of measurement of rate of the actual usable electrical power delivered to a system per unit time Watts ÷ 1,000 One kW = 1.34 horsepower
Kilowatt hours (kWh)	A unit of measurement of electrical energy produced or consumed in terms of Watts x hours ÷ 1,000

Mega Watt hours (mWh)	A unit of measurement of electrical energy produced or consumed in terms of Watts x hours ÷ 1,000,000
Peaking	Periods during which the electrical demand is great
Substation	A facility within a power grid that connects transmission lines to distribution lines. It typically contains transformers, switches, protection and other components.
Switch Gear	Miscellaneous electrical equipment such as switches, transformers, etc.
Synchronized	The process of adjusting characteristics of generated electricity to match those of the grid
Transformer	Electrical equipment that increases or decreases the voltage of AC power

Hydraulic Terms	
Abutments	A structure that supports or founds the dam at the banks or between sections of the dam
Auxiliary Spillway	A spillway to limit the water level in the forebays of the 1931 powerhouse
Buttress	A structure that holds keeps the dam or a wall from falling over due to the forces on the upstream dam or wall
Crest	The highest point of the dam to which water and rise before overflowing the dam
Crest Gates	Gates installed on a dam's crest regulating the water level above the dam crest ─ also called flood gates

Drainage Area	The area of land that drains to a point in a water course
Emergency Spillway	The additional spillway that comes into use when the water surface behind the dam reaches the maximum desired level
Filling Gates	Large gates had smaller ones built into them. Their purpose was to allow equalization of water pressure on each side of the larger gate to reduce the required opening force.
Flash Boards	Temporary wooden boards or logs used to increase the maximum water level behind the dam by temporarily raising the dam
Gates	Structures that can be raised or lowered to allow water to flow into a channel or over a dam
Gauge	A device that measures the water level or flow rate in the river
Head	The height of water above a turbine, or gate — Head is frequently used as a synonym for potential energy or kinetic energy or for water pressure
Hydroelectric	A facility to use water to generate electricity
Sluice	A short pipe or open channel through water passes
Spillway	The downstream face of the dam or weir over which water flows
Toe	The bottom of the spillway on the downstream side
Weir	A notch that is built at the top of a wall to limit the water level behind the wall because the weir's crest is lower than the wall

Generation Facilities	
Draft tube	A pipe at the outlet of a turbine through which water discharges into the tail race ─ Draft tubes can be various shapes.
Exciter	An electrical device that creates electricity to power an electro-magnet in the generator
Forebay	The structure that stores water immediately upstream of the penstocks in the 1906/1910 powerhouse and that precedes or contains the turbines in the 1931 edition
Francis Turbine	A turbine in which the water causes a runner with curved blades to spin a shaft ─ Water can enter the turbine either from the top or sides then exit at the bottom of the turbine.
Gate Hoist	A device that lifts or lowers a gate
Governor	A device that senses the rotational speed of a turbine shaft and causes the speed to remain at a target value by opening or closing the turbine's wicket gates
Head	A measurement of potential energy based on the difference in water level. For a turbine head is the elevation difference between water in the forebay and in the tail race.
Hoist Gate	A gate or door that serves as a valve to either allow or prevent water from flowing into a channel, penstock or sluice.
Hoist Gate Stem	A long stem that the gate hoist moves up or down to open or close the hoist gate or a gate on a sluice

Kaplan Turbine	A turbine whose blades are propellor-like and located on the shaft that is turned by the blades - At Martinsville, the pitch or angle of the blades were adjustable, and they were also controlled by the governor.
Kinetic Energy	The energy of the water that is based upon how fast it is flowing
Penstock	A pipe through which water flows from the forebay to the turbines
Potential Energy	The energy that is available from the difference in water surface elevations
Raceway or Mill Race	An open channel through which the water flows from the forebay to the powerhouse
RPMs	The rate of spinning of a shaft measured in revolutions per minute
Runner	The portion of a turbine that is turned by the water
Tail Race	An open channel into which draft tubes discharge
Trash Rack	A set of steel bars that screens trash such as sticks, leaves and fish to prevent them entering the turbines; The 1906/1910 versions may have been wooden.
Turbine or Wheel	A machine that uses the flow of water to cause a shaft to turn thus converting the energy in the water to mechanical energy
Wicket Gates or Wickets	Gates that surround the turbine to control the water flow into it ─ Wickets are controlled by the governor which causes shafts, belts and levers to move for opening and closing the wickets.

Other	
Efficiency	A numerical measure of how effective a machine is for its intended purpose ─ typically the ratio of energy produced by with respect to energy into the machine
Force Account	A unit cost bid item for which the quantities are unknown ─ such as tons of rock to be excavated
MSL	A distance measurement of vertical distance above mean sea level
Plug Tobacco	A tobacco product made by pressing tobacco leaves together to make a solid ─.It is used by biting or cutting off a piece and placing between the cheek and gum, or by smoking.
S. Morgan Smith (SMS)	A York, Pennsylvania company that manufactured hydraulic machinery such as turbines, gates, gate hoists, etc.─ It was founded by S.Morgan Smith, a prolific inventor of the 1800s.
Sanborn Fire Insurance Maps	Maps drawn to describe buildings' vulnerabilities of loss due to fires
Woodward	A company that manufactured governors for regulating the flow of water to a turbine

Appendices

Appendix-1 Table of Advantages and Disadvantages of Electric Power Generation Using Steam or Hydropower

	Steam		Water	
Consideration	Advantages	Disadvantages	Advantages	Disadvantages
Design Challenges	More cookie cutter			Very Site Specific
State of Technology	Engines were proven	Steam turbines were relatively new	More established	
Expandability	More engines and turbines could be added	More site limitations		Dam and powerhouse must accommodate growth
Adjustable to demands		Less flexible – need to fire boilers up more	Easy with more or less flow to turbines	
Labor Required		A little more additional labor for handling coal, operation and maintenance for steam engines	Less labor needed to maintain dam	
Capital Costs				Much higher
Operating Costs		Steam engines add to maintenance costs	Less – water is free	
Useful Life			Longer- silt limited	Can be silt limited
Fuel reliability	Coal was a common commodity at the time			HIGHLY Weather and flow dependent
Transportation Needs		Must be Near R R for coal		Longer power lines more likely
Impacts to adjacent area		Smokey	Only flood easement needed	
Plant Location	Can be closer to users	May complete for developable land	Less likely to compete for developable land	Very limited to suitable sites
Land Costs		Higher due to competition		More acreage required for facilities and flooding easements
Available Sites	Could be several	Multiple capital costs with distributed sites	May not compete with economic development sites	Limited river dam sites

Appendix-2 Relevant Newspaper Articles and Summaries of Council Minutes

Date	Relevant Newspaper Articles and Summaries Council Minutes[1]	Source
May 27,1902	Pannill Rucker was elected to town Council.	May 27,1902 Richmond Times Dispatch (Virginia Chronicle Library of Virginia)
May 29,1903	Martinsville & Smith River Light and Power Co. agreed to Council's terms, but the contract had yet to be signed.	May 29,1903 Roanoke Times (Virginia Chronicle Library of Virginia)
November 01,1904	The town acquired options on land and water power from R.J. Reynolds for building a 300-hp.power plant.	November 1,1904 Roanoke Times (Virginia Chronicle Library of Virginia)
February 19,1905	The town was making arrangements to begin work on the dam.	February 19,1905 Roanoke Times (Virginia Chronicle Library of Virginia)
July 04,1905	The town bought 1100 acres+/- called Roundabout.	July 4, 1905 Roanoke Times (Virginia Chronicle Library of Virginia)
January 01,1906	The town built a 15-ft dam at Hairston's mill for generating electricity at a cost of $75,000 to generate 500 hp.	January 1,1906 Richmond Times Dispatch (Virginia Chronicle Library of Virginia)
May 23,1909	The Smith River had high flows. The Council met regarding providing power to the Martinsville Cotton Mill.	May 23,1909 Roanoke Times (Virginia Chronicle Library of Virginia) (Martinsville, Virginia Town Council Minutes, 1903 -1931)
October 03,1909	The heavy machinery of Rand & Tuggle who had the dam raising contract had arrived and was being installed.	October 3,1909 Roanoke Times (Virginia Chronicle Library of Virginia)
January 30,1910	Mr. Watt Stone was killed when a derrick fell and caused a timber to fall on him at the Smith River dam.	January 30, 1910 Roanoke Times (Virginia Chronicle Library of Virginia)

March 16,1910	The electric plant furnished about 500 hp. and a new 500-hp. generator was added to support a new cotton mill to whom the town had agreed to furnish electric power. The ownership of electric plant had proven to be a success.	March 16, 1910 Roanoke Times (Virginia Chronicle Library of Virginia)
September 28, 1924	What was called an almost unprecedented rainfall caused heavy floods, causing serious damage to lowland corn and other crops. Small streams could not be crossed. The municipal electric powerhouse was flooded to a depth of several ft, putting machinery out of commission.	(Martinsville-Henry County Historical Society, n.d.)
1930	In 1930, the municipally owned Martinsville telephone system was purchased by Burgie Lee Fisher of Franklin County, Va. who added it to his Lee Company's holdings. The newly acquired system had 1,000 telephones, or stations as they were called, but it was in very poor condition. Fisher set out to improve and expand the Martinsville facilities. The proceeds from the sale were to be applied to the dam expansion.	Website (Justia US Law, n.d.)
June 15,1931	Council accepted General Electric's $16,748 proposal to supply electrical equipment for the powerhouse improvements and S.Morgan Smith's $15,352 proposal for supplying one vertical adjustable blade water turbine, and governor for the power house improvements plus equipment for water pumping station improvements ─ all pending Saville and Williamson's approval.	Henry Bulletin (Newspapers.com 1931)
August 18, 1931	Advertisements for sealed proposals were published.	Henry Bulletin (Newspapers.com 1931)
August 26, 1931	Sealed Proposals were received.	Henry Bulletin (Newpaper.com 1931)
May 4, 1932	Martinsville's improved hydro-electric power plant was put into operation with the lowering of the crest gates.	Henry Bulletin (Newpaper.com 1931)
[(1)]Martinsville Council Minutes (Martinsville, Virginia Town Council Minutes 1903-1931 Courtesy of Karen Roberts)		
Minutes and articles were not researched beyond November 9, 1932		

Appendix-3 Council Meeting Details

This appendix is the author's interpretation and summary of the Council's minutes. (Martinsville, Virginia Town Council Minutes 1903-1931 Courtesy of Karen Roberts) Direct quotes are shown in *italics*.

Page	Date	Details
279	April 10, 1903	Council, had in March 1903 created a special committee to investigate the probable cost of a municipal electric lighting plant. The special committee reported that if power were to be provided, it should be generated by a steam plant, but its cost would be inexpedient. The special committee was directed to investigate further.
282 - 288	April 21 1903	Council resolved to advertise that the town was seeking proposals for the construction, operation and maintenance of a steam engine electric power generation and transmission system. The requirements were for an initial capacity of 300 hp within six months and an additional 350 hp was to be delivered within two years. If the capacity within the two-year period exceeded the required total of 650 hp, no more than 60 hp could be sold outside of the town. The accepted proposal would be granted a 30-year non-exclusive franchise. Also, within the initial six-months, the franchisee was required to install an electrical lighting plant and transmission system that would be adequate to supply street lighting, consisting of 20 arc lights of 2,000 candle power, within the town for ten years at an annual rate of $70 per light plus any additional lights of 2,000 candle power the Council desired at an annual rate of $60 per light. Council could extend the time by either ten or twenty years. The future rates paid to franchisee would remain at the initial annual rate of $60 per light. For non-municipal users, residents, firms or corporations, monthly rates were also set for lights of various candle powers. For more-or-less continuous use, annual maximum rates were set on a horsepower basis.

296 - 299	May 23, 1903	A single bid was received from the Smith River Electric Light and Power Company - Pannill Rucker President. It included alterations to Clause four ● to increase time for the initial 300 hp to 12 months from the date of the ordinance accepting the proposal ● to increase the time to two years from the date of the ordinance for an additional 300 hp. ● and that if capacity exceeds 600 hp from a 20-ft dam across Smith River, ".....*all of the excess horsepower produced by such a dam is to be transmitted into the corporate limits* of *the town of Martinsville when there is demand and contract for the same, with the exception of sixty-horsepower which is to be reserved out of said excess and not out of said six hundred-horsepower herein before provided for*; ● and the bidder shall not be responsible for errors in the stipulations of the ordinance for which the bidder was not responsible. Council passed a motion that referred the bid to a special committee. Pannill Rucker who was a member of Town Council abstained from voting and Council did not appoint him to the special committee.
299-300	May 25,1903	The Council met to receive the report of the special committee appointed on May 23, 1903. The report recommended the bid of the Smith River Electric Light and Power Company be accepted. The Council then voted that the Clerk of the Council and three Council members be appointed to prepare an ordinance making the grant to the Smith River Electric Light and Power Company without substantial variation of the accepted bid. Pannill Rucker abstained and was not appointed to the special committee.

307	July 6, 1903	The following motion was adopted, "*Whereas an electric plant to be erected operated and maintained by the town of Martinsville, Virginia, or by contract with other parties therefor, is necessary for the lighting of said town, the operation of its waterworks, the propulsion of its proposed street cars and for other municipal purposes, and whereas the charter of said town and the general laws of the state have vested the Council of said town with authority to issue the bonds of said town when thereunto authorized as provided by law, in a sufficient amount to acquire by purchase or condemnation the necessary land, and to construct, equip, and maintain such electric plant; therefore it is ordered by the Council that* a *committee be appointed by the Mayor to ascertain plans for the location and establishment of said electric plant and the probable cost thereof, and said committee is authorized to receive and report propositions for the sale to said town of sites and easement suitable to the location and erection of said electric plant."* Rucker was not appointed to this committee.
319-320	Date estimated as July 24,1903	Two members (Blair and Williamson) of the special committee appointed July 6,1903 submitted written recommendations that were adopted by the Council. These recommendations were to repeal the ordinances and resolutions that granted a franchise to the Smith River Electric Light and Power Company because the company had not complied with the items of the ordinance and resolution. The Council then without determining the location and plans of erection of an electric plant, directed that the special committee "*be continued and empowered to invoke the assistance of a capable representative of one or more of the companies engaged in constructing electrical equipment and ascertain the probable costs of equipping the plant described in their report, and that the committee also ascertain by actual examination for location, the length of dam and depth of its foundation and the probable cost of the same including the bulkhead and powerhouse; and they may employ such assistants as may be in their opinion be necessary, and shall ascertain without delay what amount of money will closely approximate the sum necessary to fully erect and equip said electric plant, so that the voters of the town may be asked to authorize the issue of the necessary bonds for that purpose."*

365-369	January 22, 1904	The Council had received a communication from a citizens' committee. The citizens committee had on January 18, 1904 resolved that: "*First, They favored the establishment at the earliest date practicable, of an electric system in our town*. *Second, That the power of said system shall be water and not steam.* *Third, That said system shall be owned and controlled by the municipality of Martinsville, and* *Fourth, We are unalterably opposed to the granting of a franchise to a private corporation, or individual for the above purpose.* *In order that the wishes of our citizens as herein are expressed may be carried out, it is further resolved that H.S Burch, C.R. Bryant, I.M Groves, G.R Hudley Jr., A.B, Smith and J.R. Smith by our authority are hereby appointed a committee to confer with the Town Council of Martinsville to the end that all things which are legal, and proper to be done shall be done as early as the public welfare will admit.* The citizens committee then recommended to the Council that Council adopt a resolution that the citizens of the town favored the establishment of an electric system in Martinsville; that the July 6, 1903 special committee be ordered to investigate any and all water power rights and all available horsepower that may or can be used, including their titles which can be obtained; and to authorize and empower the special committee to employ suitable engineers.

367-369	January 22, 1904	Council received the report from the July 6, 1903 special committee that was directed "*to ascertain and report plans for the location and establishment of a*n *electric plant to be erected operated and maintained by the town of Martinsville, Virginia, or by contract with other parties therefor, is necessary for the lighting of said town, the operation of its waterworks, the propulsion of its proposed street cars and for other municipal purposes and the probable costs thereof."* The report stated: *"First···such an electric plant should have an efficiency equal to six hundred-horsepower when delivered into the town, and that it is most economical and convenient to generate the electrical force necessary to produce such power by the natural waterpower at Smith's River.* *Second···the best plan for the utilization of the natural power of said river is by the erection of a suitable dam, bulk-head and powerhouse in and across said river at some suitable point where the water fall as the stream and its foundation may invite such construction, and by means of turbine water wheels and an electric dynamo to transmit the power by means of copper wire into the said town···.* *Third···Our attention has been invited to a location on Smith's River about six miles from Martinsville and below the mouth of Marrowbone Creek. ··· We have secured the optional right for sixty days ··· for the town of Martinsville to purchase the optional right ··· We are of the opinion that an expenditure of sixty thousand dollars will be necessary ··· for expense of operating and maintaining the plant ··· ".* Council then ordered that the special committee with citizen members be continued with instructions to investigate the available waterpower near the town with authority to acquire options in any of said water powers as the committee saw best and to employ a competent engineer to assist them in their investigations.

373-374	February 12, 1904	Special Committee of July 6, 1903 reported to Council: "… *the best action to take for the transmission of electricity for the town from any point on Smith's river … We beg to state that we are satisfied the town can acquire waterpower in Smith's River sufficient to develop 600 horsepower at a cost of from ten to twelve thousand dollars. But we see not need of employing an engineer to furnish us a detailed report of the power we have in view, unless some provision can be made to get the necessary money to purchase the water power to equip a power plant…unless the Council deem it best … ."* Council then directed the special committee to ascertain the costs of securing the services of a person or persons skilled in electrical and hydraulic engineering to aid them in ascertaining through a survey of the water powers on Smith's River, and the cost of the required facilities, and "*to ascertain what the establishment of an electric lighting plant merely, whether run by steam or water power will cost the town."*
394-395	April 7, 1904	Council ordered that the Special Committee of July 6,1903 "… *employ Mr. Scott agent of Lockwood and Green Co. of Boston Mass. To assist them in investigating the "Hairston" and other water power of Smith River and to make the necessary surveys and estimates, and to such other work as may be necessary in ascertaining the amount of power that can be derived, by a reasonable and practicable development, from the river … and the cost of the highest practicable development of the water power of Smith River … and bringing such power into the town … "*
415	June 13, 1904	The report of Lockwood Greene and Co. of their estimates of the costs of the development of the quantity and costs of the electrical development of the Smith River near Hairston's Mill was read. Council postponed action until the next Thursday.
...-	June 16, 1904	These minutes were missed during research. According to the June 25,1904 minutes, a special committee was established to close the option of the town obtained from Col. Peter Hairston and to purchase the property for $12,500.
418 - 419	June 25, 1904	The special committee of June 16,1904 reported that the option of the town obtained from Col. Hairston had been closed and a deed conveying the property to the town had been made. The Clerk of the Council was directed to file, for recordation, the deed and accompanying map with the Henry County Clerk. Council also agreed to supply Col. Hairston with electric power without charge at his home for ten years.

425-426	June 25, 1904	Council and T.A. Ranson agreed that Ranson, being desirous of carrying into effect a previous promise, will pay, at regular rates, for ten years, the electricity furnished to Col. Hairston's dwelling.
445	Date not captured during research July1 estimated	Council agreed to rent the property obtained from Col. Hairston to J. D. Aaron for five months for $100. The special committee previously appointed by Council reported that they were negotiating for waterpower rights and securing estimates for the development of the Smith River water power at the Hairston mills site.
446	Date not captured during research July 1 estimated	Payment to Lockwood and Greene Co. was referred to the Town Engineer.
447 - 448	October 27, 1904	R.J. Reynolds appeared in person before Council "*to sell to the Town of Martinsville for $1000 cash the privilege and option to buy from said Reynolds, within 90 days from this date, the real estate and waterpower of said Reynolds with all the improvements thereon and appurtenances thereto belonging, on the south side of Smith River in Henry County, Va, known as Smith River Mills, including the water power and water rights in said river belonging to said Reynolds, and all other property on said real estate except for the waterwheels now thereon, at a price of $8000, it being agreed between the Town and Said Reynolds that in the event said option is closed and said property purchased by the Town within the said 90 days that the said sum of $1000 to be paid for said option shall be a credit on said purchase price and that the remaining $7000 shall earn interest....from this date* " Council ordered that an option contract be prepared and submitted to Council the next day, and that a resolution be prepared for Council's approval requesting the Circuit Court to order an election for submitting to the Town's voters for the issuance of bonds for an electric light and power plant.

449-455	October 28, 1904	The July 6,1903 the special committee reported to Council that they recommended that proper steps be taken at once for the issuance of 34-year bonds in the amount of $60,000 bearing an interest of five percent. This amount, after making ample allowances, will cover the costs of land, water rights, dam, powerhouse, transmission to the town plus the costs of a pump and water pumping station. Based on best available information, the power project will develop 513-hp at the dam, of which 421-hp can be delivered to the town. Council approved and adopted the report. Council then approved the option contract between the town and Reynolds, and upon Reynold's execution of the contract, a warrant for $1000, the price of the option, be drawn and delivered to Reynolds. Council then resolved that the town desired to issue bonds in the amount of $60,000 with an annual interest rate of five percent. The remainder of this meeting was related to bond details.
477-480	January 13, 1905	The subject of this meeting was bond details.
482-483	January 20,1905	Council received and accepted the proposal by General Electric Company at its expense," *to do the necessary engineering and other preliminary* work *required for the preparation of plans and specifications for the electrical equipment (including all electrical machinery and appliances for the transmission of the electric power proposed to be developed by the Town by the use of the water power of Smith River into the Town, and for the establishment if an electric lighting system for said town and for the equipment of an electric power pumping plant for pumping water ····and connecting the same with the electric power plant ··· and to submit a bid for the construction of said electric power lighting and pumping plant in said specifications."* If the specifications are acceptable to the special committee, the contract is to be awarded to the company. Council authorized the Chairman of the Finance Committee to make arrangements with one or both of Martinsville's banks for the $1,000 payment to R. J Reynolds.

487-488	February 17, 1905	The Special Committee recommended that the General Electric proposal be modified to protect the town and upon completion of the agreed upon modifications between the town and General Electric that a contract reflecting the modified proposal be presented to Council.
490	February 18, 1905	The contract between the town and General Electric was submitted to Council who ordered the contract be awarded to General Electric.
499-502	Date not captured by the research	The title to the R.J. Reynolds conveyance was submitted to Council with the recommendation that a survey be prepared and the corners monumented, and that the deed from Reynolds be accepted and that he be paid. Council instructed the Town Engineer to submit data to the Henry County Board of Supervisors the town's order for the necessary changes of the road through the Col. Hairston lands in connection with the waterpower development. A voltage related amendment to the General Electric contract was approved. (Pg.501) Council appointed a special committee, with the assistance of the Town Engineer, " ··· *to complete the necessary data and specifications for contracts for the work to be done by the town in connection with the establishment of the electric plant with authority to receive bids and award contracts."* Council ordered that a special committee be appointed as soon as practicable to report on proposed rates to be charged by the town for incandescent commercial lighting.
503	March 10, 1905	Council ordered that a special committee be appointed " ··· *to make contracts for the work to be done by the town in building of a stone dam across Smith River for said plant, fifteen feet high with sufficient base to admit of increasing the height of said dam seven feet without additional thickness at base".*
515	March 28,1905	Council authorized the negotiation and selling of the second series of the Electric Plant bonds.
519	April 1905	The special committee reported that the contracts for the construction of the dam for the electric plant had been agreed upon but not yet signed by the contracting parties.

525-526	April 26, 1905	A special meeting was called to address additional land that needed to be acquired for the establishment of the power plant on the Smith River. Construction of the dam would flood a 1,184-acre tract of land that was located on the both sides of the river. It was the property of the heirs of Elizabeth S. Gravely and was known as "Roundabout Farm." Council retained attorneys to negotiate the purchase of the land .
539-541	June 9, 1905	J.R. Gregory. Plant Superintendent and Town Engineer reported that, "*he had torn down the old mill at the river belonging to the town and asked that someone be appointed to sell the surplus lumber therefrom."* Council ordered the superintendent to make the best disposition of the old Hairston Mill lumber. Council ordered and authorized the mayor to execute a contract with S.S Ordway for the building of the dam across the Smith River. Council ordered that a 58-acre tract of land along both the north and south banks about 1,500-ft upriver be condemned since the town and the owners, the Gravely family, could not reach an agreement. The land was needed for flooding rights. "*It appearing to the Council that it is necessary ··· in establishment of its electric power plant to acquire ··· a part of the Roundabout Farm."*
552-553	July 14, 1905	Council ordered that pursuant to the award of an arbitration, the town pay $250 to Thomas Burch for the right and privilege to flood his land adjoining the land purchased from Col. Hairston along the north bank of the Smith River.
593	December 16, 1905	The third series of bonds for the electric power plant was authorized.
Page No. Not cap-tured	December 22, 1905	A special committee was created to develop an ordinance and regulations related to the operation and maintenance of the municipal electric plant, to regulate the furnishing of lights and power to private concerns and to define regulations for the plant.
25	Date not captured	An order was passed to publish the ordinance for the management and operation of the municipal electric power plant, to regulate the furnishing of lights and power to private citizens and to describe penalties for the violating them.
56	October 16, 1906	The Public Property Committee was authorized to auction two small tracts on the south side of Smith River that had been part of the R.J. Reynolds purchased but no longer needed.

111	August 9, 1907	Council authorized the acceptance of a contract with Aaron Poros to supply up to 50 hp for the use for Poros's mill. Repairs to the Power plant canal were authorized.
227	July 12, 1909	The Special Committee on the Power Contract with the Martinsville Cotton Mills was instructed to confer with the Chairman of the Henry County Board of Supervisors to ask for permission to raise the bridge across Smith River just below the dam. Martinsville Cotton Mills wanted more power, and to provide it, an increase in the dam height was believed to be needed. "*The matter of obtaining an agreement with T.G. Burch as to the amount of damages to be paid to him on account of the proposed increase of the height of the Electric Plant Dam is referred to the Special Committee on Power Contract with the Martinsville Cotton Mill."*
228	July 16, 1909	The Special Committee on Power Contract with the Martinsville Cotton Mill reported that they and T.G. Burch were unable to come to an agreement on the amount of damages, but that Burch was willing to arbitrate. Council also agreed to arbitrate, and they indicated the terms of arbitration they wanted.
236-237	August 18,1909	The employment of C.P.E Burgwgn as consulting engineer to investigate the conditions with reference to the increased development of the power at the Smith's River dam was authorized. Compensation was not to exceed $75 plus expenses. A contract with General Electric for supplying electric equipment for the purpose of the improvement of the electric plant, and for a duplicate pump at the Jones Creek water pumping plant was approved.

238-239	August 30, 1909	Council accepted an offer by Martinsville Cotton Mills who would issue a bond to pay the town for the increase in power capacity of the Smith River Power plant. A report from C.P.E Burgwgn, consulting engineer was referred to the special committee on Electric Plant Enlargement. Council ordered that "*the capacity of the electric plant be enlarged by an additional 7 feet to the dam across the Smith River and with other such construction and equipment as will provide the highest practicable development for power under said increased head*." The special committee on Electric Plant Enlargement was empowered to make contracts, prepared by the town attorneys, for the construction, equipment and labor for the additional seven ft.
260	December 20, 1909	Council accepted the arbitrators' finding that $800 would be paid to T.G. Burch for the damages resulting from the raising of the dam.
265	January 19, 1910	Council approved payments for insurance increase for the power plant.
244	September 10,1909	Authorization was given for the purchase and installation of an additional water wheel or wheels at the powerhouse.
337	December 9, 1910	A special committee on the Electric Plant Enlargement submitted the final estimate of the construction by Rand & Tuggle who was under contract to make the enlargement. The town had loaned Rand & Tuggle $1000. After deducting the $1000 loan and $70 interest, the town owed $694.10 to Rand & Tuggle and $2,474 to R. H. Rand which included the 10% retainage held by the town until completion of the contract.
254	November 12, 1909	Council authorized payments of $198 and $990 to Rand & Tuggle for the monthly estimated for the enlargement project.
267	February 16. 1910	A special committee submitted to Council a schedule of salaries paid and to be paid to the employees of the municipal electric light and power plant for the year 1910. Salaries were $100 per month for W.H. Fontaine, electrician and pump engineer, $75 per month for J.H Pharis, engineer at powerhouse, and $60 for S.J. Carter, engineer at powerhouse.

272	March 15, 1910	Warrants to be drawn payable to SMS were ordered for a waterwheel and fixtures to be installed at the enlargement of the powerhouse. The warrants were $1,462.34 cash, $1,462.33 payable May 15, 1910,and $1,462.33 payable August 15,1910 all totaling $4,387 which was the agreed upon contract price.
292	April 30, 1910	Mr. C.W. Saunders of Henry County offered to sell town land and water power rights for land along Marrowbone Creek. A Special committee was appointed to investigate.
254	November 12, 1909	Council authorized monthly payments to Rand & Tuggle.
307	June 24, 1910	Council asked Mr. C.W. Saunders, owner of the Eggleston Falls site, to appear before Council to prove his title to the land and rights.
307	June 30, 1910	Mr. Saunders responded that he will not appear unless Council agreed to the option. Council asked that the option be extended 60 days for further investigation. (Research on the Marrowbone site was ended.)
90	July 11,1921	A.L. Tuggle appeared before Council to request that the town relinquish their flooding rights to his land on the north side of the river that the town had previously acquired to accommodate the further raising of the dam. Mr. Tuggle contended that an increase of eight ft, the maximum height increase practicable, would not flood his land. Council ordered the Town Engineer to investigate and survey the potential overflow on Tuggle's land or other matters affecting the town's interests if Tuggle's request was granted.
July 20, 1922	97-98	Regarding Mr. Tuggle's request, the Town Engineer reported that his investigation indicated that no more than 1/3 of an acre would be flooded with a dam height increase of eight ft, but less than one acre of another tract owned by Tuggle that was formerly a part of Horseshoe Stock Farm would be flooded. Additionally, about 15 acres of Tuggle's lands lying along Doe Run, also on the river's north side would be flooded by a depth of approximately six ft Tuggle proposed to convey to the town the right to overflow the Doe Run land in exchange for the relinquishment of the overflow rights for Horseshoe Stock Farm which Tuggle had purchased from Pannill Rucker. Council accepted Tuggle's offer, and directed the Town Attorney to prepare the deeds.

421-422	September 28,1925	Based upon the report of a special committee recommending the acceptance of an offer for the proposed purchase of an auxiliary 350-horsepower steam powered electric plant in case of an emergency for $12,300, the Council ordered that the offer be accepted. (No information was found to indicate if the steam plant was purchased or where it was to go.)
246	July or August 1930	Council declared that part of the proceeds from sale of the town's telephone enterprise could be used for Electric Plant Bond payments.
251	August 9, 1930	Council ordered that Allen Saville, Incorporated, engineers make a survey and investigation for the proposed improvements to the Electric Power plant, including an increase of the dam height for the fee of $1,100. The matter of the ownership of a dwelling erected by the city near the powerhouse was ordered to be investigated.
308	January 1931	The report of the Committee on Finance and the Committee of Lights and Power jointly indicated that either of two options proposed by Allen J. Saville Inc. for the improvement of the hydroelectric plant would be profitable to the city, but the Committees desired more time for evaluation and consultation with the engineers. Council approved.
311	February 10, 1931	Scheme B of Saville and Williamson (formerly Allen J. Saville) was approved, and if found feasible to be financed, and that steps be taken to proceed with the project. The matter was referred to the Committees of Finance and Lights and Power for evaluation and reporting back to Council.
312	February 10, 1931	The proposal of Saville and Williamson to prepare plans and specifications for Scheme B of their report and under the supplemental plan of December 23,1930, for the improvement of the city electric plant was submitted to Council for further consideration. (No other reference to the supplemental plan was encountered.)

362	May 12, 1931	General Electric presented a proposal to Council regarding their supplying electrical equipment and, on behalf of SMS, a letter describing the general terms of their proposal for supplying the hydraulic equipment. Council was not satisfied that the extent of riparian and backwater rights had been determined so they ordered that immediate steps be taken to fully ascertain the riparian and backwater rights that might be impacted by the power plant improvements. Until the riparian and backwater rights were ascertained and reported to the Council, and until the consulting engineers approved the proposals for the electrical and hydraulic equipment, none of the proposals would be executed.
366-369	June 9, 1931	Council agreed to pay A.L and K.W. Tuggle $1,200 for the town's right to submerge and overflow Tuggle's land along the Smith River. An agreement between the city and T.C. and I.C. Matthews to exchange lands, rights and easements on the north of the river and upstream of the state highway bridge was accepted. The Saville and Williamson proposal submitted to Council on May 12,1931 was accepted. The General Electric proposal dated May 6,1931, at a cost of $16,748 was accepted. Council directed that the SMS proposal of May 12, 1931, be referred to Saville and Williamson for negotiations with SMS and that the resulting detailed contract be returned to Council for approval.
378-379	June 19, 1931	An SMS proposal for the supplying of hydraulic machinery for the improvement of the Electric Power plant including one vertical adjustable blade Kaplan turbine, governor and water pumping equipment for $15,352 was accepted as said proposal had been approved by Saville and Williamson. The General Electric proposal of June 9,1931 for the city to purchase electrical equipment for the powerhouse improvement was accepted as said proposal had been approved by Saville and Williamson.

381-	July 1, 1931	The July 1, 1931, General Electric proposal for the sale, delivery and installation of one 375 kVA vertical waterwheel driven generator and equipment for $6,900 had been approved by Saville and Williamson, Inc. and was accepted by the Council. Council ordered the City Attorney to prepare deeds for the exchanges between the city and A.L. Tuggle ex ux and the and Matthews et ux.
410-411	September 30, 1931	Council ordered the recording and execution of deeds for the exchanges between the city and A.L. Tuggle ex ux and Matthews et ux.
428	December 8, 1931	Council ordered that additional work for $5,000 as recommended by Saville and Williamson, Inc. proceed as soon as Saville and Williamson, Inc. complete the necessary plans and specifications.
597-598	November 9, 1932	Council declined to pay I.C. Dehart for expenses for clearing his land along Smith River overflowed since the raising of the Smith River dam. Council referred to a special committee the matter of claims by John L. Wray and Frank Finney. A previously appointed special committee recommended the claims of damages due to increasing the water level of the Smith River on account of raising the dam by means of crest gates be submitted to arbitration. The Clerk of Council was ordered to inform Wray and see if he was willing to arbitrate.
End of the Research on Council Minutes		

Appendix-4 Deeds

Peter Hairston to the Town of Martinsville
Deed Book 32 Page 595 HCCCCO.
See Figure – 3.1.1 for Plat on back of page 594

595

Town of Martinsville
From } Deed
Peter Hairston

The Vendor's Lien reserved in this deed has been paid in full 12 May 1906
P. Hairston
Teste:
J. H. Matthews
Clerk

THIS DEED made this 25th.day of June 1904,between Peter Hairston,party of the first part, and the Town of Martinsville,Virginia,party of thr second part,WITNESSETH: That for and in consideration of the sum of twelve thousand five hundred dolloars,$12580.00,of which five hundred dollars is paid in cash,the receipt whereof is hereby acknowledged,and the residue of which is to be paid in two equal instalments of six thousand dollars each,one instalment in six months and the other in twelve months from the date hereof,with interest at 6% per annum,the said Peter Hairston doth grant,bargain,sell and convey unto the said Town of Martinsville,in fee simple,the following water power,rights of way,easements,rights,privileges properties and land,with the appurtenances thereto belonging,viz: First: All the water power,water rights and privileges,mills,machinery,dam and buildings owned by the said party of the first part,situated and being on Smith's River in Henry County,Virginia,about two miles South of said Town of Martinsville,known as the Smith's River or Irvin Mill;together with the tract or parcel of land described and bounded as follows: Beginning at a leaning Horn beam on the North bank of Smith's River,thence N.50 E.300 feet to a stake,thence N.40 W.400 feet to a large red oak,thence N.50 E.300 feet to a stake,10 feet beyond a large Beech, thence at right angles N.40 W.470 feet to a stake in a ravine,thence S.48 W 218 feet to a persimmon across the road from the new mill,thence N.55 W.975 feet to a stake in said Peter Hairston's hog lot 12 feet to the left of a large beech,thence S.27 W.124 feet to Smith's River at a point where the road leading to Roundabout farm leave the turnpike,thence down the River as it meanders,about 1800 feet to the beginning;which description is understood and intended to cover not only the land embraced therein,but the call"from the point on Smith River where the road leading to the Roundabout farm leaves the turnpike down said river as it meanders to the beginning"is understood as including the river to the middle thereof,as well as the Island upon which the present dam of said Hairston abutts;and the whole of said island is hereby conveyed by said Hairston to the party of the second part, whether it be embraced in the foregoing description or not. Second: The right of way,to be selected and located by the said party of the second part,over and across the lands now owned by the said Peter Hairston to erect and plant posts;place,operate and maintain lines for the transmission of electricity,or for other purposes;and the right of ingress and egress over and across said lands,with laborers,teams &c.,to construct,repair and maintain said lines. Third:The right to upon the lands now owned by the said Peter Hairston and to quarry,take,carry away,and use any and all rock or stone found thereon,with the right to go upon,over and across said lands with laborers,teams and other means for transportation,for the purpose of removing said rock or stone;provided that the stone so taken shall be used

the purpose of removing said rock or stone; provided that the stone so taken shall be used in, upon or about the improvement of the property herein conveyed, or in the developement of the water power of Smith's River at or near said property. Fourth: The right, privilege and authority to overflow with water, at any time in the future, any land now owned by said Hairston on Smith's River, or on "Doe Run" branch, that may be overflowed by the erection of a dam across said river, not exceeding 34 feet in height, at any point between the upper end of the island aforesaid and the leaning horn beam on said river, heretofore mentioned; the said Peter Hairston, his heirs and assigns, or alienees, hereby releasing any claim to damages occasioned by the erection of such dam between said points, either on account of the lands overflowed, or of any damage to the residue of said lands not overflowed, as well as all other damages occasioned by the erection of ~~said~~ such dam. The said Peter Hairston covenants and agrees upon the part of himself, his heirs and assigns or alienees that, should it be deemed necessary by the Town of Martinsville to change the present location of the public road through his lands at any future time, he will grant to Henry County a thirty foot right of way through said lands for said new location, without further compensation therefor, and with out claiming any damages for injury to the residue of his tract of land by reason of said change; the said right of way to be located as agreed upon by the County of Henry and said

596

Town, so that said road be located at some point in front of the dwelling house now occupied by the said Hairston and South of the stable near his said dwelling.

The said Peter Hairston, for himself and his heirs, further covenants that he is seized in fee simple of the water power, rights, lands and properties hereby conveyed, with the appurtenances aforesaid; that he has the right and lawful power to convey the same, in fee simple, to the said Town of Martinsville; that the said Town of Martinsville and its assigns shall have quiet and peaceable possession thereof forever; that said water power, rights, lands and properties, with appurtenances aforesaid, are free from all incumbrances and charges whatsoever; and that he, the said Peter Hairston & his heirs, will execute such further assurances of and for the same as may be requisite to make the title thereto of the said Town and ~~assignees~~ assigns sure and complete forever. The said Peter Hairston hereby retains a vendor's lien on the property herein conveyed to secure the payment of the deferred instalments may be paid off and discharged by the said Town of Martinsville at or before they become due, as the officers and agents of said Town may deem best.

Witness the following signature and seal the day and year first above written.

P.Hairston, (SEAL)

State of Va., Henry Co., to-wit:

I, T.G.Burch, a Notary Public in and for the County aforesaid, in the state of Virginia, do hereby certify that Peter Hairston, whose name is signed to the foregoing deed, bearing date on the 25th. day of June 1904, this day personally appeared before in my County aforesaid and acknowledged the same to be their act and deed. Given under my hand this 25th. day of June 1904.

T.G.Burch, N.P.

My commission expires July, 3rd. 1904.

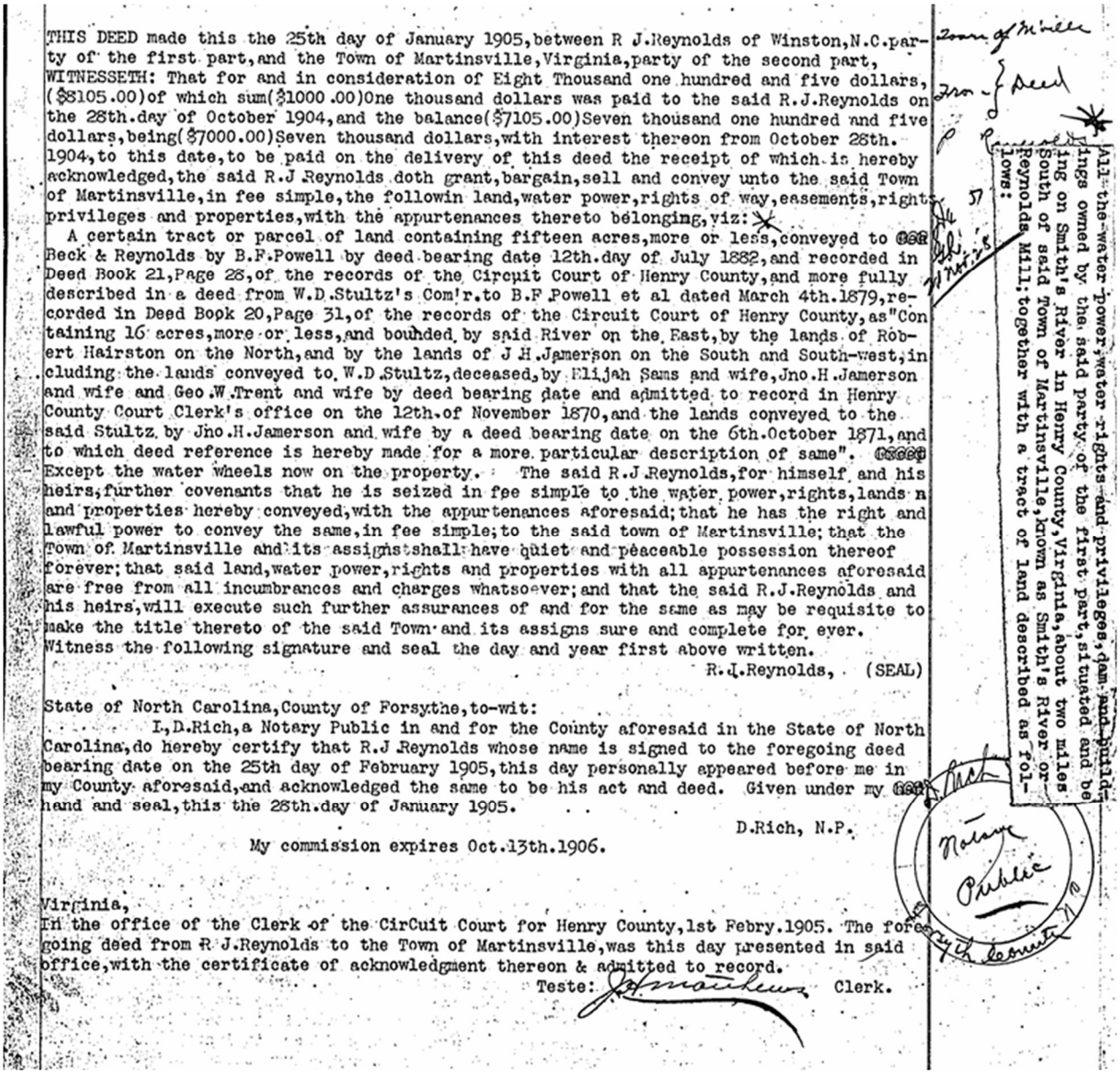
Virginia,

In the Clerk's office of the Circuit Court for Henry County, 27th. June 1904.

The foregoing deed from Peter Hairston to the Town of Martinsville, was this day presented in said office, with the certificate of acknowledgment thereon & admitted to record.

Teste: J.H.Mauck Clerk.

R.J. Reynolds to the Town of Martinsville Deed Book 33 Page 136 HCCCC



THIS DEED made this the 25th day of January 1905, between R J.Reynolds of Winston, N.C. party of the first part, and the Town of Martinsville, Virginia, party of the second part, WITNESSETH: That for and in consideration of Eight Thousand one hundred and five dollars, ($8105.00) of which sum ($1000.00) One thousand dollars was paid to the said R.J.Reynolds on the 28th. day of October 1904, and the balance ($7105.00) Seven thousand one hundred and five dollars, being ($7000.00) Seven thousand dollars, with interest thereon from October 28th. 1904, to this date, to be paid on the delivery of this deed the receipt of which is hereby acknowledged, the said R.J Reynolds doth grant, bargain, sell and convey unto the said Town of Martinsville, in fee simple, the followin land, water power, rights of way, easements, right privileges and properties, with the appurtenances thereto belonging, viz:

A certain tract or parcel of land containing fifteen acres, more or less, conveyed to Geo Beck & Reynolds by B.F.Powell by deed bearing date 12th. day of July 1882, and recorded in Deed Book 21, Page 28, of the records of the Circuit Court of Henry County, and more fully described in a deed from W.D.Stultz's Com'r. to B.F Powell et al dated March 4th. 1879, recorded in Deed Book 20, Page 31, of the records of the Circuit Court of Henry County, as "Containing 16 acres, more or less, and bounded by said River on the East, by the lands of Robert Hairston on the North, and by the lands of J H.Jamerson on the South and South-west, including the lands conveyed to W.D.Stultz, deceased, by Elijah Sams and wife, Jno.H.Jamerson and wife and Geo.W.Trent and wife by deed bearing date and admitted to record in Henry County Court Clerk's office on the 12th. of November 1870, and the lands conveyed to the said Stultz by Jno.H.Jamerson and wife by a deed bearing date on the 6th. October 1871, and to which deed reference is hereby made for a more particular description of same". Except the water wheels now on the property. The said R.J Reynolds, for himself and his heirs, further covenants that he is seized in fee simple to the water power, rights, lands and properties hereby conveyed, with the appurtenances aforesaid; that he has the right and lawful power to convey the same, in fee simple; to the said town of Martinsville; that the Town of Martinsville and its assigns shall have quiet and peaceable possession thereof forever; that said land, water power, rights and properties with all appurtenances aforesaid are free from all incumbrances and charges whatsoever; and that the said R.J.Reynolds and his heirs, will execute such further assurances of and for the same as may be requisite to make the title thereto of the said Town and its assigns sure and complete for ever. Witness the following signature and seal the day and year first above written.

R.J.Reynolds, (SEAL)

State of North Carolina, County of Forsythe, to-wit:

I, D.Rich, a Notary Public in and for the County aforesaid in the State of North Carolina, do hereby certify that R.J Reynolds whose name is signed to the foregoing deed bearing date on the 25th day of February 1905, this day personally appeared before me in my County aforesaid, and acknowledged the same to be his act and deed. Given under my hand and seal, this the 28th. day of January 1905.

D.Rich, N.P.

My commission expires Oct. 13th. 1906.

Virginia,
In the office of the Clerk of the CirCuit Court for Henry County, 1st Febry. 1905. The foregoing deed from R J.Reynolds to the Town of Martinsville, was this day presented in said office, with the certificate of acknowledgment thereon & admitted to record.

Teste: J.F. Matthews Clerk.

All the water power, water rights and privileges, dam and buildings owned by the said party of the first part, situated and being on Smith's River in Henry County, Virginia, about two miles South of said Town of Martinsville, known as Smith's River or Reynolds Mill; together with a tract of land described as follows:

PEOPLES SAVE STATIONS, INC.,
A Virginia corporation

FROM: DEED

005221

PRILCO RENTALS, INC.,
A Virginia corporation

THIS DEED, made this 24th day of November, 1998, by and between ***PRILCO RENTALS, INC.,*** *a Virginia corporation,* party of the first part and Grantor herein, and ***PEOPLES SAVE STATIONS, INC.,*** *a Virginia corporation,* party of the second part and Grantee herein.

WITNESSETH: That for and in consideration of the sum of Ten Dollars ($10.00) cash in hand paid to the Grantor by the Grantee, and other good and valuable consideration, the receipt of all of which is hereby acknowledged, the Grantor does hereby bargain, sell, grant and convey, in fee simple with General Warranty and English Covenants of title, unto the Grantee, Peoples Save Stations, Inc., a Virginia corporation, the following described property, to-wit:

All that certain lot or parcel of land with improvements thereon located and appurtenances thereunto appertaining, situated in the Ridgeway Magisterial District of Henry County, Virginia, lying on the southwest side of State Route 706, and being known and designated as Parcel A-1, of 1.45 acres as shown on survey for the City of Martinsville, Virginia, as prepared by J. A. Gustin, C.L.S. on December 16, 1969, and revised July 23, 1970, and described as follows, to-wit: *BEGINNING* at an iron pin in the west line of a fifteen (15) foot wide strip of land reserved to increase the right-of-way of State Route #706 to a sixty foot width and also being between the herein described parcel of land and a tract of land owned by the J. Ben Davis Estate; thence off from said point S 54 deg. 16' 50" W. 92.51 feet to an iron pin on the bank of Smith River; thence N. 21 deg. 23' 13" W along a traverse line (the property line being along the center of Smith River) 181.46 feet to a point; thence continuing N 23 deg. 04' 27" W. 199.24 feet to a point; thence continuing N 30 deg. 53' 34" W. 147.43 feet to a point in the dividing line between the herein described Parcel A-I and Parcel A-2; thence off from Smith River and with said dividing line N

BK0843PG0120

GARDNER, GARDNER, BARROW & SHARPE, P.C.
4th Floor - First Citizens Bank Building
231 E. Church Street
Martinsville, VA 24112
540-632-2455

GARDNER, GARDNER, BARROW & SHARPE, P.C.
4th Floor - First Citizens Bank Building
211 E. Church Street
Martinsville, VA 24112
540-632-2455

47 deg. 47' 00" E. 173.38 feet to a point in the west line of the above mentioned fifteen foot reserved strip of land; thence with said reserved land S. 25 deg. 38' 12" E. 78.38 feet to a point; thence S. 9 deg. 25' 00" E. 145.25 feet to an iron pin; thence S. 7 deg. 10' 00" E. 150.84 feet to an iron pin; thence S. 23 deg. 54' 51" E. 87.27 feet to an iron pin; thence S. 29 deg. 12' 16" E. 112.13 feet to the point of beginning, containing 1.45 acres and being "Parcel A-1" as shown on the map last mentioned; and

BEING the same identical property Prilco Rentals, Inc., a Virginia corporation, acquired from Frost & Company, Inc., a Virginia corporation, by deed dated January 28, 1975, and of record in the Clerk's Office of the Circuit Court of Henry County, Virginia, in Deed Book 258, page 909, to which deed and survey reference is here had for a more particular description of the property hereby conveyed.

This conveyance is made subject to all lawful easements and rights-of-way properly of record in the aforesaid Clerk's Office; and specifically, this conveyance is subject to the fifty foot easement reserved by the City of Martinsville located between the fifteen (15) foot wide reserved strip of land situated adjacent to the right-of-way of Route #706 and Smith River and also being adjacent to the south line of the above described Parcel A-1, all as shown on said map.

THE WITHIN DEED WAS PREPARED WITHOUT BENEFIT OF A TITLE EXAMINATION OR CURRENT SURVEY.

IN WITNESS WHEREOF, Prilco Rentals, Inc., a Virginia corporation, has caused this instrument to be signed by David Prillaman, its President, this the day and year first above written:

PRILCO RENTALS, INC., a Virginia corporation

By David Prillaman Pres.
David Prillaman, President

STATE OF VIRGINIA, AT LARGE,
CITY OF MARTINSVILLE, TO-WIT:

I, Bethy Carol Summers a Notary Public in and for the State of Virginia, at large, do hereby certify that David Prillaman, President of Prilco Rentals, Inc., a Virginia corporation, whose name is signed as such to the foregoing instrument bearing date of November 24, 1998, has personally acknowledged the same before me, within my City and State aforesaid.

Given under my hand this 24th day of November, 1998.

My Commission expires: 5-31-2000

Betty Carol Summers
Notary Public

VIRGINIA: In the clerk's office of the Circuit Court of Henry County, 12-2, 1998, this deed was this day received in said office, and, upon the certificate of acknowledgment thereto annexed, admitted to record, at 2:29 o'clock P M, after payment of $ 27.50. Tax imposed by Sec.58.1-802

Teste: Juanita J. Stewart, Clerk

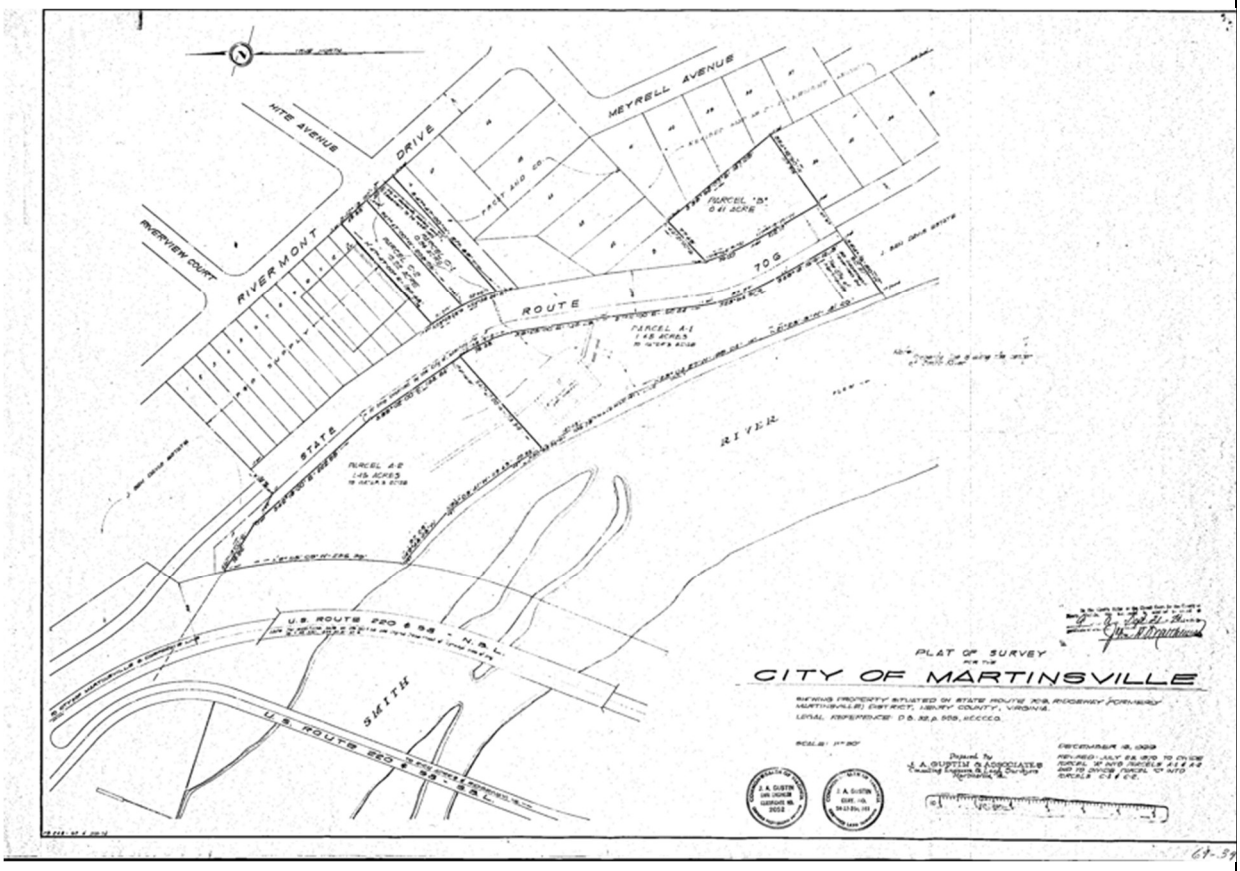
Tax $ 41.25
Local Tax $ 13.75
Transfer Fee $ 1.00

BK0843PG0122

3

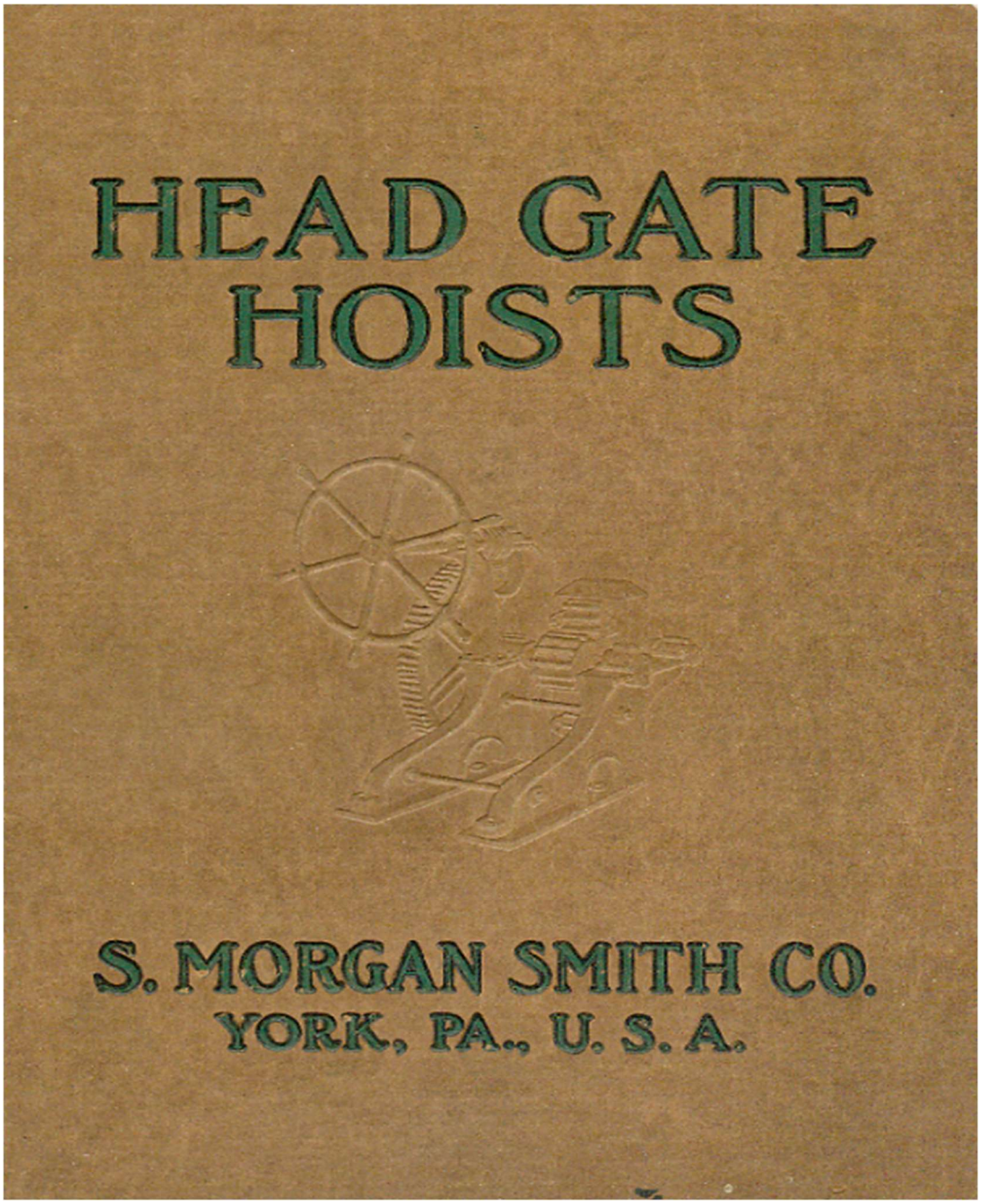
GARDNER, GARDNER, BARROW & SHARPE, P.C.
4th Floor - First Citizens Bank Building
231 E. Church Street
Martinsville, VA 24112
540-632-2455

Map Book 46 Page 8 HCCCCO that was Referenced in DB843 Page 120



Note: This Plat was drawn by Jake Keller in 1969. The author may have been on the survey crew that performed the surveys in 1969 and 1970. Frank Mariels' brother James Tate Mariels may have been the crew leader. The ruins of the old powerhouse were shown in light lines. The ruins' purpose was not known to Mr. Keller or the author at that time.

Appendix-5 Excerpts from S. Morgan Smith Bulletin of Head Gates Hoists, Gate Hoists and Valves (Pyle, 2018)



BULLETIN OF

HEAD GATES, GATE HOISTS AND VALVES

BULLETIN 180 SEPTEMBER, 1910

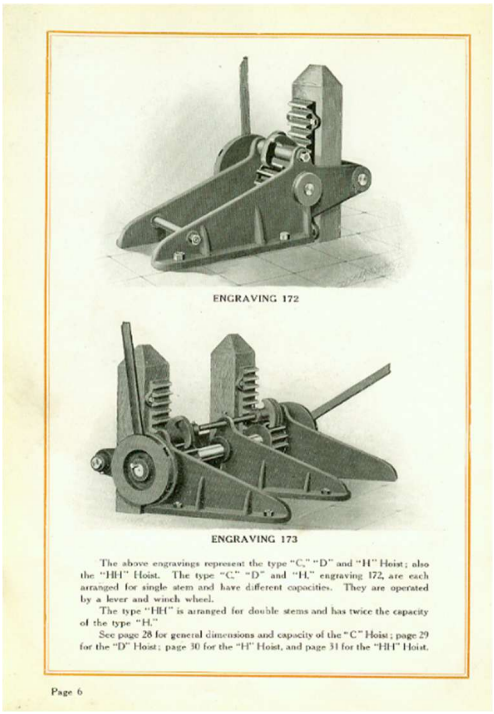
MANUFACTURED BY
S. MORGAN SMITH COMPANY
YORK, PA., U. S. A.

CABLE ADDRESS
"SUCCESS"

CODES USED
A. B. C. 4th and 5th Editions
Western Union
Liebers Private

CHICAGO OFFICE
644 American Trust Bldg.

BOSTON OFFICE
176 Federal St.



ENGRAVING 172

ENGRAVING 173

The above engravings represent the type "C," "D" and "H" Hoist; also the "HH" Hoist. The type "C," "D" and "H," engraving 172, are each arranged for single stem and have different capacities. They are operated by a lever and winch wheel.

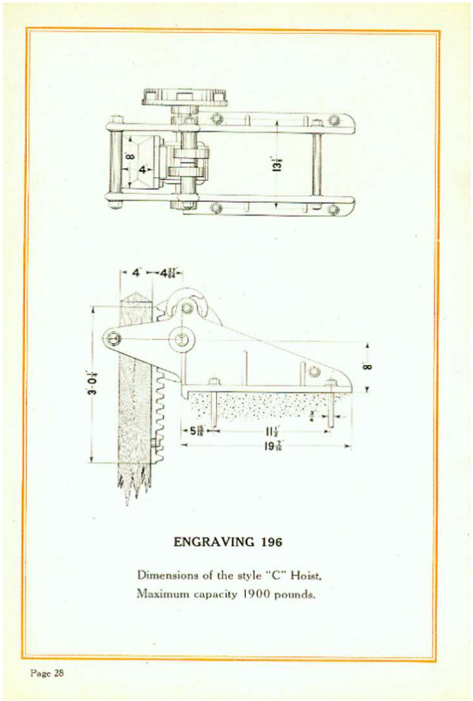
The type "HH" is arranged for double stems and has twice the capacity of the type "H."

See page 28 for general dimensions and capacity of the "C" Hoist; page 29 for the "D" Hoist; page 30 for the "H" Hoist, and page 31 for the "HH" Hoist.

Page 6

Type C, shown on Engravings172 and 196 had a capacity of 1,900 pounds and was used on the dam and upper forebay.

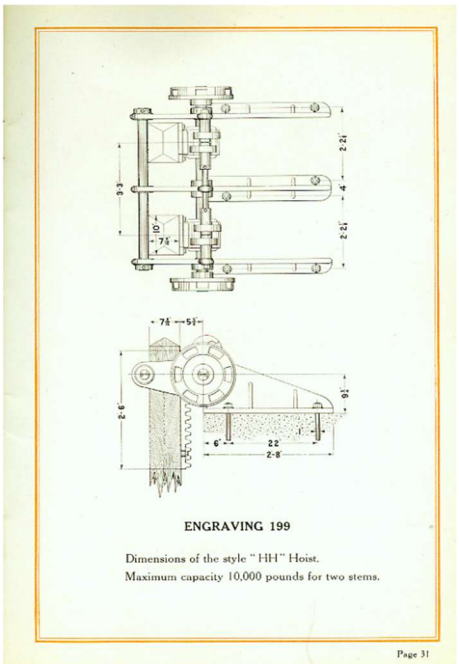
Type HH, shown on Engravings 173 and 199, had a capacity of 10,000 pounds and was used at the powerhouse for the penstocks.



ENGRAVING 196

Dimensions of the style "C" Hoist.
Maximum capacity 1900 pounds.

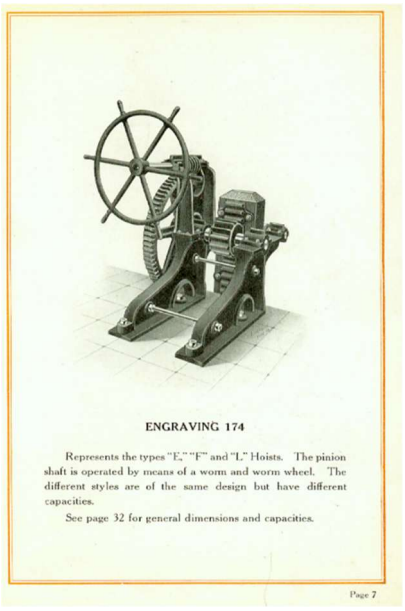
Page 28



ENGRAVING 199

Dimensions of the style "HH" Hoist.
Maximum capacity 10,000 pounds for two stems.

Page 31



ENGRAVING 174

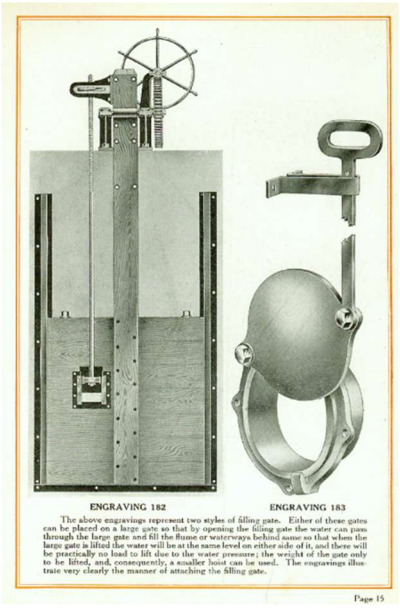
Represents the types "E," "F" and "L" Hoists. The pinion shaft is operated by means of a worm and worm wheel. The different styles are of the same design but have different capacities.

See page 32 for general dimensions and capacities.

Page 7

Engraving 174 shows the gate hoist style for the lower forebay structure drain.

D

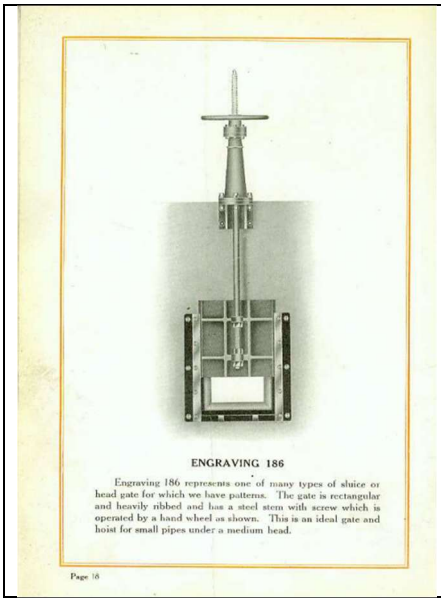


ENGRAVING 182 ENGRAVING 183

The above engravings represent two styles of filling gate. Either of these gates can be placed on a large gate so that by opening the filing gate the water can pass through the large gate and fill the flume or waterways behind same so that when the large gate is lifted the water will be at the same level on either side of it, and there will be practically no load to lift due to the water pressure; the weight of the gate only to be lifted, and, consequently, a smaller hoist can be used. The engravings illustrate very clearly the manner of attaching the filling gate.

Page 15

Engraving 182 shows what the head gates at the old powerhouse would have looked like. The gate hoists were style HH as shown on engraving 173. Note the filling gate.



ENGRAVING 186

Engraving 186 represents one of many types of sluice or head gate for which we have patterns. The gate is rectangular and heavily ribbed and has a steel stem with screw which is operated by a hand wheel as shown. This is an ideal gate and hoist for small pipes under a medium head.

Page 18

Engraving 186 shows how the 1931 powerhouse's initial forebay drain gate looks. The operating stand is similar, but the operator is a hand crank instead of a hand wheel. (Kendrick, 2023)

Appendix-6 DCR 2022 Inspection Report

Virginia Department of Conservation & Recreation

Date Prepared: 10/18/22
Prepared By: Mattern & Craig, Inc.

ANNUAL INSPECTION REPORT FOR VIRGINIA REGULATED IMPOUNDING STRUCTURES

Reference: Impounding Structures Regulations, 4VAC 50-20-10 et seq., including 4VAC 50-20-105, Virginia Soil and Water Conservation Board

Owner's Information

Name of Dam:	Smith River Dam	Inventory Number:	8913
Owner's Name:	City of Martinsville, Electric Department	Location-County/City:	Henry County
Contact Person (if different from above):	Durwin Joyce		
Owner's Address:	55 West Church St., Martinsville, VA 24114	Hazard Classification:	Class 1
Name of reservoir:	Smith River Impound		
Purpose of reservoir:	Hydroelectric Generation		
Telephone No.:	(Residential) 276-340-3426	(Business)	276-403-5293
Other means of communication:	Cell: 276-252-7674		

Owner's Engineer

Name of Engineering Firm and Engineer:	Mattern & Craig, Inc., C. Thomas, J. Cutright
Professional Engineer Virginia License Number:	036962 012535
Mailing Address:	701 First Street, SW, Roanoke, VA 24016
Telephone No.:	(Business) 540-345-9342

Directions: Make note of all pertinent conditions and changes since the last inspection, or, if this is the first inspection, since the filing of a design report.

Date of This Inspection 9/20/22
Date of Last Inspection 8/22/19

1. EMBANKMENT

a. Any alteration made to the embankment? **No**

b. Erosion on embankment? **No**

c. Settlement, misalignment or cracks in embankment? **No**

d. Seepage? If so, seepage flow rate and location (describe any turbidity and observed color within the flow): There was active flow down the face of the dam flowing over all the gates.

2. UPSTREAM SLOPE

a. Woody vegetation discovered? **No**
b. Rodent burrows discovered? **No**
c. Remedial work performed? **No**

3. INTAKE STRUCTURE

a. Deterioration of concrete? There is one 10 SF spall and several minor leaks on the bottom half of the concrete structure and one medium leak (less than 1 gpm) at the interface of the powerhouse and the wingwall on the south (downstream) face of powerhouse structure. There are a couple of minor leaks on the bottom half of the east face of the powerhouse. There is heavy scaling on auxiliary spillway on the west side of powerhouse. There is medium scaling on the top of the concrete slab downstream of the trash racks.

b. Exposure of rebar reinforcement? **No**

c. Is there a need to repair or replace the trash rack?

The two 25' headgates at the powerhouse are the principal spillway. The steel gates have old minor corrosion of the steel framework with no significant section losses. The gates were closed during the inspection and the generator was not operating. The steel equipment supports have minor old corrosion. Both headgates were repainted in June 2014. The screens had minor trash and debris and exhibited minor corrosion. The power supply cord for the screen rake hangs down in the walking area.

d. Any problems with debris?

The City reports that they are cleaning the debris once per day and more often if necessary. The screen rake is operable.

e. Was the drawdown valve operated?

The sluice in the powerhouse intake serves as the low level outlet and was open at the time of the inspection. The right hand generator is typically operated daily but is currently undergoing maintenance repairs. The larger generator (left hand side) is down and requires maintenance.

4. ABUTMENT CONTACTS

a. Any seepage? If so, estimate the flow rate and describe the location of the seep or damp areas (describe any turbidity and observed color within the flow): None noted.

5. EARTHEN EMERGENCY SPILLWAY

a. Obstructions to flow? If so, describe plans to correct: **N/A**

b. Rodent burrows discovered? **N/A**

c. Any deterioration in the approach or discharge channel? **N/A**

6. CONCRETE EMERGENCY SPILLWAY

a. Deterioration of concrete?

Flow over the dam during the inspection impeded visual inspection of concrete. Previous inspection reported the following:

There was an approximate 200 SF gunite spall/delamination at the top of the spillway at Gate 4 and an approximate 300 SF gunite spall/delamination near the base of the spillway between Gates 7 & 8 and 60 SF spall/delamination between gates 6 & 7. There was minor cracking and spalls/delaminations (up to 30 SF each) of concrete shotcrete on Gates No. 3, 4, 7, 8, 9, 10, 11, 12, 13 and 14. The majority of the concrete shotcrete below Gates 10 through 14 was replaced in the Fall of 2003. Gunite on river side of right abutment was 30% delaminated, but intact. Top surface of emergency spillways have medium to heavy scaling. Minor undermining at toe of emergency spillway grouted riprap, 3 ft. back under, on bedrock.

Auxiliary spillway. 3' x 3' area of thin gunite patch spalled at 1st and 2nd weir openings from west abutment. The erosion control block area was well vegetated.

b. Exposed steel reinforcement? Welded wire fabric exposed in larger spalls on face of spillway.

c. Any leakage below concrete spillway?

There was flow down the face of the dam from leakage around and under the gates and flow over gates (approximately 0.2 ft.). Therefore, any seepage was not visible.

Auxiliary spillway. There was some minor clear seepage through the rock wall at the auxiliary spillways as follows:

1. 3-4 gpm in 1st auxiliary spillway. The seepage in this area is seeping at a concrete to concrete vertical joint and at a concrete to rock horizontal joint.
2. Less than 1/2 gpm in 2nd.
3. Less than 1/2 gpm in 3rd.
4. 1/2 gpm in 4th.
5. 1/2 gpm on east side of 4th spillway.

One seep in each of the 1st and 4th weir openings from the abutment just past Gate 14 exhibits iron staining. There is also a 1 gpm seepage high on the stream side of the stone abutment just past Gate 14.

d. Obstructions to flow? If so, lists plans to correct: **Medium to heavy vegetation (including trees) in emergency spillway.**

13. DOWNSTREAM/HAZARD ISSUES

a. New development in downstream inundation zone?

Downstream Channel Area: Clear – no erosion. The City reports no new developments in the downstream inundation zone since the previous reinspection report.

b. Note the maximum storm water discharge or peak elevation during the previous year.

City did not report any abnormal high water event in 2021/22. A high water event was reported with an elevation slightly over top of dam 697.8 in April, 2019. All gates were opened to lower elevation below flood stage during the April 2019 event.

c. Was general maintenance performed on dam? If so, when?

The operator reported that all gates are now electric and that the gate cart is no longer used. He inspects the cables on the gates weekly. Seepage is monitored daily. Floating debris is removed when it comes and vegetation is trimmed around the dam as needed. The gates are opened at least semi-annually and more often during high water events. Debris and limbs around the gates are removed yearly.

d. List actions that need to be accomplished before the next inspection: See recommendations.

---

14. OVERALL CONDITION ASSESSMENT OF IMPOUNDING STRUCTURE AND APPURTENANCES

(Check one) ☐ **SATISFACTORY** ☑ **FAIR** ☐ **POOR** ☐ **UNSATISFACTORY** ☐ **NOT RATED**

1. SATISFACTORY
No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.
2. FAIR
No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.
3. POOR
A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. POOR may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.
4. UNSATISFACTORY
A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.
5. NOT RATED
The dam has not been inspected, is not under state jurisdiction, or has been inspected but, for whatever reason, has not been rated.

General Comments:

The dam is well maintained and in fair condition. Upstream water surface El. was 696.2. The Emergency Spillway consists of fourteen 20' x 6' gates. There is also an Auxiliary Spillway consisting of 6 weir openings. The top of the gates is 696.0. The larger (1050 KV) turbine was offline. The smaller (450 KV) turbine is offline. Dam operators maintain a minimum flow of 45.9 mgd. Auxiliary Spillway: 6 weir openings with a crest of 697.8. It appears from water levels that the top elevation is closer to 697.2.

Walkway is in good condition. All surfaces of the walkway support beams and the railings were painted in June 2014. There is some minor paint deterioration and light rust noted on the handrails and supports. Timber decking was replaced with fiberglass grating in July 2014. The handrail on the concrete abutment just past gate 14 has three posts with one anchor bolt missing.

Dam warning signs were replaced on the dam face and upstream. Warning signs are in English and Spanish.

Recommendations:

1. Continue to monitor seeps in structure and toe drains.
2. Replace missing handrail anchor bolts.

---

3. Modify the power supply for the screen rake so that it doesn't conflict with the walkway area. We understand the City plans to replace the existing screen rake.
4. Repair spalled and delaminated areas of gunite on emergency and auxiliary spillways and on powerhouse structure.
5. Remove limbs and debris from around gates.
6. Remove logs and debris from reservoir area.
7. Continue to trim vegetation around the dam area, including on emergency spillway.
8. Continue scheduled maintenance plan.
9. Check the elevation of the top of the auxiliary spillway.

CERTIFICATION BY OWNER'S ENGINEER (required only when an inspection by an engineer is required)

I hereby certify that the information provided in this report has been examined by me and found to be true and correct in my professional judgment.

Signed: _____ Virginia Number: 036962

Professional Engineer's Signature — Chad M. Thomas (Print Name)

This 18th day of October, 20 22.

Engineer's Virginia Seal:

CERTIFICATION BY OWNER

I hereby certify that the information provided in this report has been examined by me.

Signed: Durwin Joyce — Durwin Joyce

Owner's Signature — Print Name

This 12th day of September, 20 23.

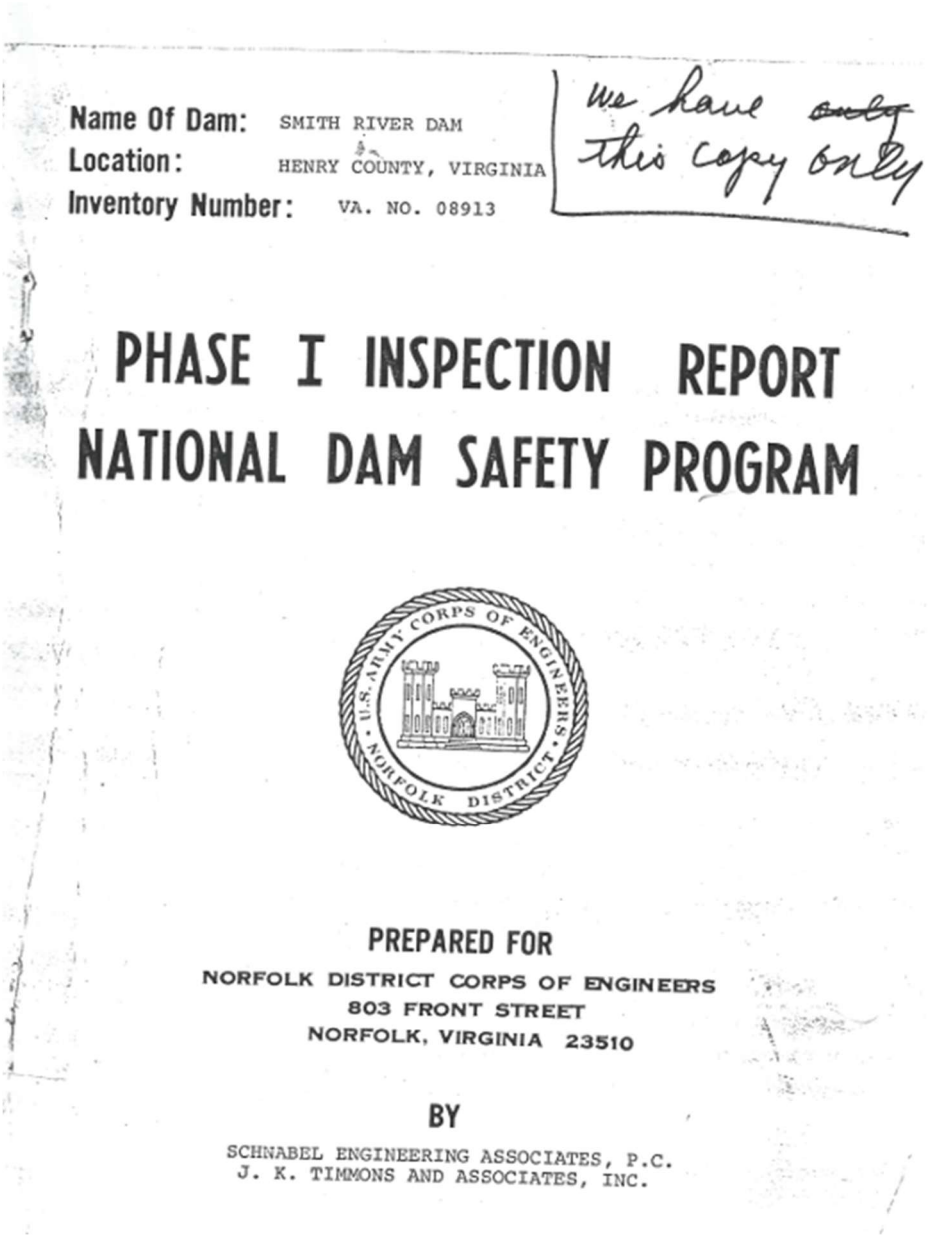
Mail the executed form to the appropriate
Department of Conservation and Recreation
Division of Dam Safety and Floodplain Management
Regional Engineer

(DCR199-098) (09/11) Page 5 of 5

Appendix-7 – U.S. Army Corps of Engineers' Phase 1 Inspection Report

(Schnabel Engineering Associates, P.C. and J.K. Timmons and Associates, Inc., 1979)

(source of annotations is unknown)



Name Of Dam: SMITH RIVER DAM
Location: HENRY COUNTY, VIRGINIA
Inventory Number: VA. NO. 08913

We have ~~only~~ this copy only

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

U.S. ARMY CORPS OF ENGINEERS · NORFOLK DISTRICT ·

PREPARED FOR
NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

BY
SCHNABEL ENGINEERING ASSOCIATES, P.C.
J. K. TIMMONS AND ASSOCIATES, INC.

PHASE I - INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Nameof Dam: Smith River Dam, Va. No. 8913

State: Virginia

County: Henry

Coordinates: Lat 36°-39.9' Long 79°-53'

USGS Quad Sheet: Martinsville

Stream: Smith River

Date of Inspection: May 1, 1979

BRIEF ASSESSMENT

Smith River Dam is a stone masonry, gravity structure approximately 538 ft long consisting of a 322 ft principal spillway, a 144.5 ft auxiliary spillway, and a 71.5 ft non-overflow section. There are 6 ft high steel crest gates along the principal spillway section and 3 ft high flash boards along the auxiliary spillway. There are two 15 ft wide intake structures which supply the turbine generator adjacent to the dam.

The dam is located on the Smith River about one-half mile south of the Martinsville, Virginia City Limits and is owned and operated by the City of Martinsville as a hydroelectric facility. Construction was completed in 1904± with major revisions in 1931. The dam is located downstream of Philpott Reservoir and flow has been regulated since 1950 for over half of the watershed. The maximum known flood was in 1938 when it is estimated there was 10 ft of water over the dam crest.

The dam is of "intermediate" size and is rated

interline added ref. memory of WCB (Dennis) in letter dated 11/30/74

a "high" hazard structure. The "high" risk category requires that the spillway pass the PMF. Analysis indicates that the dam will be overtopped during ½ PMF. The principal and auxiliary spillways are thus inadequate since they will but not seriously inadequate, not pass the spillway design flood. The principal and auxiliary spillways will pass 18% of the PMF before exceeding elevation 703 msl. This dam was designed to be overtopped during periods of high flow. A check of the stability in accordance with the Corps of Engineers' guidelines, assuming the dam is founded on the surface of the rock, indicates the structure does not meet the overturning and sliding requirements of Reference 1, Appendix V, for normal pool elevation 696. An accurate check on stability could not be made since design data and calculations were not available concerning the dam embedment. However, based on visual inspection and the service record of the dam since 1932, additional studies are not recommended.

In general, the overall condition of the dam appears to be good. The visual inspection revealed the need for the following maintenance and monitoring measures.. The stone masonry in the left auxiliary spillway of the dam has deteriorated. All loose and weakened mortar should be removed and the surface repaired with new mortar. The crest gates show leakage in several locations and the concrete sill should be repaired. Seepage in the plugged openings of the left auxiliary spillway should be monitored quarterly

U.S. Army Corps of Engineers Report Continued

to detect any increase in flow rates.. A staff gage should be installed to monitor high water levels.

Submitted By:

Original signed by
JAMES A. WALSH

James A. Walsh, P.E.
Chief, Design Branch

Approved:

Original signed by:
Douglas L. Haller

Douglas L. Haller
Colonel, Corps of Engineers
District Engineer

Recommended By:

ORIGINAL SIGNED BY:
CARL S. ANDERSON, JR.

for Jack C.Starr, R.A., P.E.
Chief, Engineering Division

Date: AUG 24 1979

Appendix-8 Smith River Dam and Hydro-Electric Plant by Dennis Bowles (Bowles, 2000)

Smith River Dam and Hydro-electric Plant

In 1905 the Town of Martinsville decided to provide electric service to its residents and businesses. The Town purchased the Hairston Mill site and the R. J. Reynolds mill site and the wooden dam, which were located at the present dam site south of town. A rock and mortar dam was built replacing the mills and wooden dam. A 1000-foot raceway was constructed on the north side leading down stream to a hydroelectric plant. The hydro-plant was built on a rock foundation with sheet metal walls. (The foundation is now part of a garage for the Peoples Save Gasoline Stations.) On June 26, 1906 the dam and power station were put into operation. There were two 150 kW belt driven generators connected to two S. Morgan Smith water wheels.

In 1910 the dam was raised six feet and the 150 kW generators were replaced with two 250 kW generators and a new 300 kW generator and water wheel was added. This plant continued to serve Martinsville's power needs until 1927 when Appalachian Electric Power Company (APCO) built a line from Fieldale to the Martinsville Cotton Mill (present site of Tultex). In 1928, APCO made interconnection through the cotton mill substation to the Martinsville power plant.

In the early 1930's the city saw a need to update the hydro plant due to increasing electrical loads. It was decided to construct a new plant on the south side of the rock dam and raise the dam. The old plant was shut down on January 25, 1932 and part of the switchboard was removed and installed in the new plant. The old plant could still be used and was operated until a short time after start up of the new plant. On May 5, 1932 the new plant with 1-1000 kW generator and 1- 300 kW generator was placed in operation. Two operators working 12-hour shifts manned the plant and a helper worked a 10-hour shift.

The plant remains in operation today but has been through several overhauls and changes. Outlined below is some of the changes or problems beginning with my earliest experiences with the plant:

- December 1973, the plant was still operated twenty-four hours a day, seven days a week by a staff of four operators working 8 hour shifts, 48 hours weekly.
- August 1974, the plant was scaled back to two operators working 8-hour shifts 40 hours per week and run as a peaking plant ceasing the 42-year history of continuous operation.

- February 5, 1980, the 1000 kW generator's water wheel sheared off and fell into the river. The Electric Department personnel disassembled the water wheel, turbine and shafts removing them from the river. At this time it was decided to rewind the generator while repairs were being made to the turbine and shafts
- May 27, 1987, the turbine draft tube on the 1000 kW unit broke loose and fell into the river. A new one was made and installed after 7 months down time.
- August 27, 1987, lightning ran in on the plant causing two surge arrestors to fail and shorting out the generator winding on the 300 kW unit. The unit was rewound increasing the output to 450kW.
- January 1989, the Supervisory Control and Data Acquisition System (SCADA) was installed. This greatly improved the accuracy of peak shaving efforts and improved generation during peak hours by providing detailed system load information in real time. The value of the hydro-plant became considerable and easily measurable.
- March 1989 personnel were scaled back to one full time position and a part-time position was added to work as needed.
- July 1994, the downstream side of the rock face dam was grouted or covered over with a concrete and sand mixture at a cost of $192,395.00. Holes were bored deep into the dam and grout was pumped in to the core of the dam to seal the leaks.
- January 16, 1995, Nine inches of rain fell in 24 hours causing a flash flood condition in the Jordan Creek area upstream from the dam. High water gauging stations are located in Bassett, which are upstream of Jordan Creek. The flood was undetected by the gauges and rushed in on the dam and plant causing the emergency spillway to overrun and the water level reached a level two feet above flood stage. This amount of water was never anticipated and destroyed the spillway. Within the following year a new spillway was designed and constructed at a cost of $174,500.00 to withstand floods of this magnitude.
- July 1, 1998, The City entered into a contract with Cinergy Inc. to provide power to its system. This contract provides inexpensive power and no demand charge, ending a 70-year association with APCO (now called American Electric Power or AEP) as a power supplier to the City. The hydro plant is run as a peaking plant due to a transmission agreement with AEP to transport Cinery power to the city. If the plant ceased operations as a peaking plant, the City would be required to pay AEP an extra $31,680.00 in 1999. This figure changes according to how much our demand is for each month during the year, through the end of the Cinergy contract (2005).
- October 1, 1998 after years of using poles to construct a trash diversion boom a new boom was purchased and installed at a cost of $8702.00. This

new boom is constructed of a steel frame with foam molded around it, enclosed in a tough plastic casing.

- April 2000, Voith Hydro Inc. completed a rebuild on the 450kW-turbine unit at a cost of $172,450.00. A new long shaft, jack shaft and head cover were made, the lower crown plate was machined to allow installation of bearings for the wicket gates to pivot on. The water wheel was trimmed down and new coupling bolts installed.

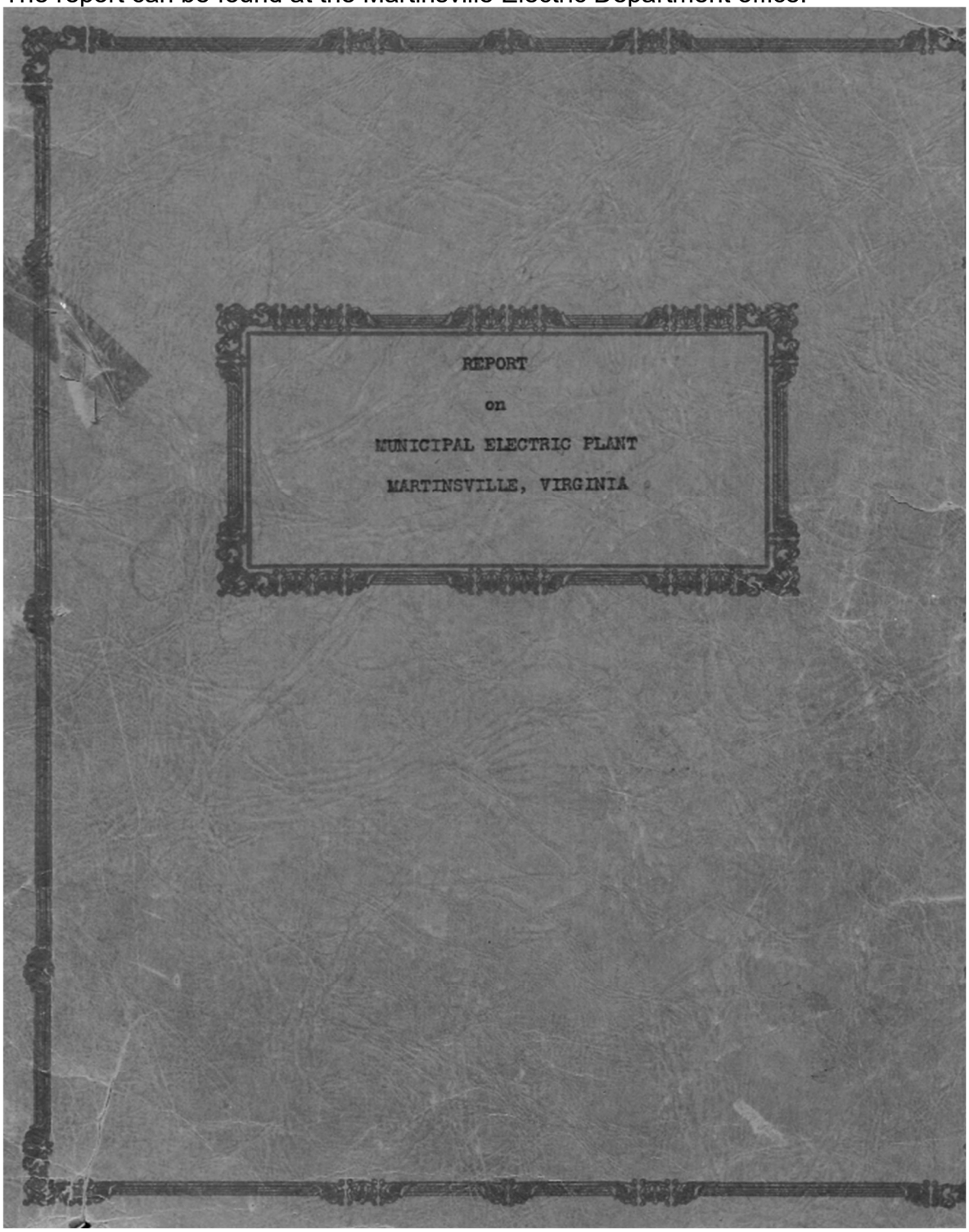
Today the City purchases approximately 98% of its power from Cinergy Inc. and power is transported through AEP transmission lines to the City. This power contract will expire in June 2005. The hydro-plant is still used as a peak generating station with an output of 1350 kW. Yearly the plant nets around $160,000.00 income to the city. Due to low water flow, the plant generates electricity only six to eight hours a day. The generators consume about 600 cubic feet per second (cfs) of water at peak operation. In comparison Philpott Dam, which is approximately 20 miles upstream releases 1260 cfs of water during most generation periods. Water released from Philpott Dam reaches the City's dam six hours later. The excess water released from Philpott fills the reservoir and then spills over the dam. Water is also released continuously from the City's dam at a rate of at least 34 cfs. This release assists the Water Resources Department's downstream wastewater treatment plant with its need to comply with State and EPA mandated water quality standards and discharge permit requirements that are based on minimum flows recorded in the Smith River.

The City's dam is regulated and licensened by the Virginia Dam Safety Agency. The dam is considered a Class I dam and is inspected every two years by a consulting engineer and a report is prepared on its condition and forwarded to the Office of Dam Safety. During flooding conditions, the plant is manned 24 hours a day until flooding conditions cease. Floodgates have to be raised and downstream flows monitored to prevent flooding of property and for the safety of the public. Extensive operator training is required to comply with the strict state standards for operation of this Class I dam.

Note: Prepared by Dennis Bowles
September 2000
Excerpts taken from the 1933
Report on Municipal Electric Plant
Martinsville, VA.
Prepared by Bryant White

Appendix-9 Excerpts from Bryant Whites's 1933 Report (White, 1933)

The report can be found at the Martinsville Electric Department office.



REPORT

on

MUNICIPAL ELECTRIC PLANT

MARTINSVILLE, VIRGINIA

Prepared by
Bryant White
February 1953

History of Martinsville Municipal Electric Plant

The Town of Martinsville with a population of 4,200 in 1905 decided to provide electric service for itself. No electric utility had been started previously. D. H. Spencer & Son, tobacco manufacturers, and Rucker & Wittan Tobacco Company each had a 3 Kw. direct current generator belted to their line shafting for furnishing lights in their own plants.

The Town purchased the Hairston Mill site on north bank of Smith River and R. J. Reynolds Mill site on south bank and replaced the old wood dam with a stone dam. The Town built a race way approximately 1000 feet in length and erected a sheet metal power station on stone foundation with two 150 Kw. three-phase 4000-volt generators belted to horizontal S. Morgan Smith water wheels operating on 22 foot head.

Lockwood-Greene were designing engineers for the dam and power station. J. R. Gregory was general superintendent and Town Engineer during the construction of the electric plant and until his death in January 1930.

The hydro plant began operation June 26, 1906 and continued until 1910 when the dam was raised six feet to 28 foot head and the two 150 Kw. generators were replaced with two 250 Kw. generators belted to the same water wheels and an additional water wheel was belted to a new 300 Kw. generator. Up to this time the maximum load was 200 Kw. A load of 400 Kw. was added at the Martinsville Cotton Mill. This cotton mill load was carried until 1927 when it was dropped to provide additional capacity for general lighting and small power purposes.

The Appalachian Electric Power Company in 1927 built a line from its Fieldale substation to supply the Cotton Mill. The Appalachian made interconnection with the municipal plant in October 1928 through the sub-station at the Cotton Mill.

The maximum load in 1932 was 890 K. V. A.

The municipal hydro plant continued operation without change in capacities until January 25, 1932 when it was shut down for the completion of reconstruction work on the dam. At this time part of the switchboard was removed. The old hydro station could be operated by replacing generator belts and installing an outgoing feeder circuit breaker.

The new plant on south side end of dam with 1300 Kw. capacity in two vertical units and 32 foot head was placed in operation May 5, 1932.

In January 1916 when Mr. J. H. Pharis was transferred from hydro station operation to town electrician and meter reader, there were approximately 250 meters for power and light and 250 flat rate lighting customers, and one flat rate power customer, Aaron Brothers Flour Mill with a 75 horse power motor for which a charge was made of $100 per month. Part of the time, during August, September, October and November and part of December, this mill operated 24 hours per day. Other parts of the year the mill operated 10 hours per day. The charge of $100 per month was said to equal the average cost per month of operation of the high speed steam engine which was replaced by the 75 horse power motor. This flat charge ran for 10 years.

MARTINSVILLE MUNICIPAL ELECTRIC PLANT

Analysis of Customers Accounts
Showing Consumption, Revenue, Average Bills and Average Rates
For the Year 1932

Class	Number Customers	Annual Kilowatt-hours	Average Kw-hrs. used per Customer	Annual Revenue	Average Annual Bill	Average Rate Per Kw-hr.
Straight Resident Light	898	311,191	347	$24,310.72	$27.07	.0781
Resident Light & Power (2 Meters)	261	Light 119,648 Power 301,489 421,137	1,614	$8,626.90 9,165.27 17,792.17	68.17	.0422
Total Residential	1,159	732,328	632	$42,102.89	$36.33	.0575
Commercial Lighting	255	503,746	1,975	$30,197.68	$118.42	.0599
Commercial Power Rate "B"	40	665,449	16,636	$19,624.57	$490.61	.0295
Commercial Power Rate "C"	1	126,400	126,400	3,618.00	3618.00	.0286
Commercial Power - Rate "Elevator"	12	15,554	1,296	719.32	59.94	.0462
Commercial Power- Rate "Refrigerator"	51	135,431	2,656	4,086.01	80.12	.0302
Total Power	104	942,834	9,066	$28,047.90	$269.69	.0297
Special Rates	24	15,232	635	704.28	29.35	.0462
Total	1,542	2,194,140	1,423	$101,052.75	$65.53	.0461

SUMMARY

Kilowatt-hours Generated, Purchased and Used by City by Months
Kilowatt-hour Sales and Losses for the Year 1932

1932	Kw-hrs. Generated	Kw-hrs. Used in Plant	Kw-hrs. Station Output	Kw-hrs. Purchased	Total Output Kw-hrs.	Kw-hrs. Used by City	Kw-hr. Sales plus Losses
Jan.	156,600	x	156,600	168,000	324,600	69,250	255,350
Feb.	0	0	0	284,900	284,900	69,195	215,705
March	7,800	x	7,800	307,000	314,800	72,555	242,245
Apr.	81,000	x	81,000	201,000	282,000	75,450	206,550
May	252,877	1,877	251,000	36,000	287,000	74,292	212,708
June	239,330	1,330	238,000	25,000	263,000	75,952	187,048
July	181,363	1,363	180,000	90,000	270,000	77,113	192,887
Aug.	119,595	1,235	118,360	172,000	290,360	78,086	212,274
Sept.	74,311	1,771	72,540	232,000	304,540	76,155	228,385
Oct.	206,406	1,746	204,660	103,000	307,660	73,358	234,302
Nov.	302,994	1,934	301,060	1,000	302,060	69,514	232,546
Dec.	309,727	2,727	307,000	0	307,000	70,984	236,016
Totals	1,932,003	13,983	1,918,020	1,619,900	3,537,920	881,904	2,656,016
% Total Output -	54.6%	.39%	54.2%	45.8%	100%	24.9%	75.1%

x No data available for plant use in old hydro station.

Kilowatt-Hour Sales & Losses for Year 1932

Sales	2,187,498
Losses	468,518
Used by City	881,904
Total Output	3,537,920

Losses 468,518 Kw-hrs. = 13.2%

Martinsville Municipal Hydro Plant on Smith River
1 mile South of City Limits

Power Plant finished May 5, 1932

Unit No. 1

G. E. Generator 1000 Kw., #5268205, 4000 volts, 180 amp., 80% pf.
180 amp. 300 Rpm. 60 cycles, 1250 Kva. continuous rating, 140 amp.
field at 125 volts, vertical with exciter direct connected on top.

Smith hydraulic governor, type TS 12000 ft. lbs. Ser. No. 258,
Unit No. 2, S. Morgan Smith, York, Pa. - Smith-Kaplan adjustable blade wheel.

Unit No. 2

G. E. Generator 300 Kw., #5278951, Type ATB, 4000 volts, 80% pf. 3-phase,
300 Kw. 375 Kva., 277 Rpm., 60 cycles, 60 amp. field current, vertical
with exciter direct connected on top.

S. Morgan Smith Serial No. 8645 30'-0" head, 517 h. p., 277 Rpm.
" " " Hydraulic governor, Type TS, 6000 ft. lbs., Ser.
No. 259, Unit #1.

1 - Constant current transformer G. E. No. 389681, 35 Kw., Type RN, 2200 volts/
75 amp., 60 cycle

1 - Constant current street light panel with ammeter and watthour meter

1 - Voltage regulator panel with synchroscope

2 - Generator panels, each with 1 voltmeter and 2 ammeters and 1 hand operated
oil circuit breaker, G. E. ML 195958601, Type HA-2

1 - Circuit panel with 3 ammeters, voltmeter and watthour meter and relays -
feeds one 4-wire, 3-phase, 3/0 feeder to City distribution system

3 - 5-Kva. transformers tapped through fuses on bus for station service

Head 32 feet. Rough stone dam, built in 1905-06; rebuilt in 1910; again
in 1932.

14 gates - each gate 6' high x 20' - 3 are motor operated, 11 are hand operated
with portable motor to operate hand gates.

Elevation head water 696 ft. above sealevel - 664 tail water.

Leaves raked by hand.

Two operators, each 12 hours.

One helper - 10 hours during day.

CITY OF MARTINSVILLE
Department of Electricity

Hydro-Electric Station Data - 5 Years 1928-1932

	River Flow Second Ft.	Kilowatt-hours Generated	Kilowatt-hours Purchased	Cost of Purchased Power	Total Kilowatt-hours Purchased & Generated
1928					
January	(Hydro-Electric Plant shut down Dec. 27, 1927 to March 6, 1928)		274,000	$3,789.60	274,000
February			273,600	3,410.70	237,600
March 6th to 31st		247,000	96,600	2,171.92	343,600
April		267,000	55,200	1,745.54	322,200
May		255,600	93,600	2,470.53	349,200
June		210,000	92,400	2,180.18	302,400
July		161,400	179,400	3,017.56	340,800
August		203,400	159,960	3,047.02	363,360
September		238,800	141,600	2,920.73	380,400
October		236,400	173,400	3,411.94	409,800
November		280,800	198,600	4,025.38	479,400
December		260,000	188,400	3,789.34	448,400
1929					
January		303,600	196,200	3,491.38	499,800
February		332,400	129,600	2,732.07	462,000
March		371,400	87,600	2,282.22	459,000
April		345,000	65,400	1,706.46	410,400
May		370,800	102,000	2,150.91	372,800
June		314,200	113,400	2,314.18	427,600
July		312,600	178,200	3,481.23	490,800
August		243,600	236,200	3,667.24	479,800
September	7,346	235,200	300,600	4,542.80	535,600
October	28,511	223,800	271,800	4,199.14	496,600
November	16,148	234,000	238,800	3,986.62	472,800
December	14,837	322,000	148,000	2,934.18	470,000
1930					
January	12,521	369,000	145,000	2,985.68	514,000
February	12,691	207,200	103,000	2,814.42	410,200
March	18,425	251,000	110,000	2,818.94	361,000
April	11,051	270,000	120,000	2,464.79	390,000
May	9,456	271,000	180,000	3,018.58	451,000
June	6,979	186,000	80,000	1,528.00	*246,000
July	3,820	108,600	188,000	2,680.00	296,000
August	3,991	102,000	181,000	2,724.30	283,000
September	4,905	75,000	240,000	3,377.97	315,000
October	3,347	76,200	256,000	3,410.42	332,200
November	4,661	134,400	190,000	2,644.62	324,400
December	7,640	186,200	162,000	2,626.14	348,200

* American Furniture Company cut off June 1, 1930

	River Flow Second Ft.	Kilowatt-hours Generated	Kilowatt-hours Purchased	Cost of Purchased Power	Total Kilowatt-hours Purchased & Generated
1931					
January	8,675	209,400	116,000	2,152.94	325,400
February	4,475	176,200	134,000	2,221.81	310,200
March	10,388	225,600	80,000	1,700,69	305,600
April	13,882	278,400	26,000	1,039.90	304,400
May	10,169	235,800	65,000	1,535.87	300,800
June	6,336	179,400	142,000	2,330.43	321,400
July	9,954	169,800	123,000	2,074.11	292,800
August	13,351	274,200	59,000	1,481.10	333,200
September	3,561	127,200	205,000	3,124.55	332,200
October	3,310	106,200	263,000	3,559.67	369,200
November	3,392	85,800	239,000	3,333.30	324,800
December	5,924	148,800	195,000	2,677.94	343,800
1932					
January	13,907	156,600	168,000	2,396.19	x324,600
February	15,112	-	284,900	3,907.86	284,900
March	19,495	7,800	307,000	3,906.59	xx314,800
April	13,883	81,000	201,000	2,873.55	xx282,000
May	7,529	251,000	36,000	1,114.00	xxx287,000
June	7,389	238,000	25,000	1,070.75	263,000
July	4,730	180,000	90,000	1,473.08	270,000
August	3,432	118,360	172,000	2,292.97	290,360
September	2,494	72,540	232,000	2,808.54	304,540
October	8,000	204,660	103,000	1,792.82	307,660
November	8,000	301,060	1,000	454.82	302,060
December		307,000			

x Old plant shut down January 25th

xx Old plant operated several days during high water in March and April

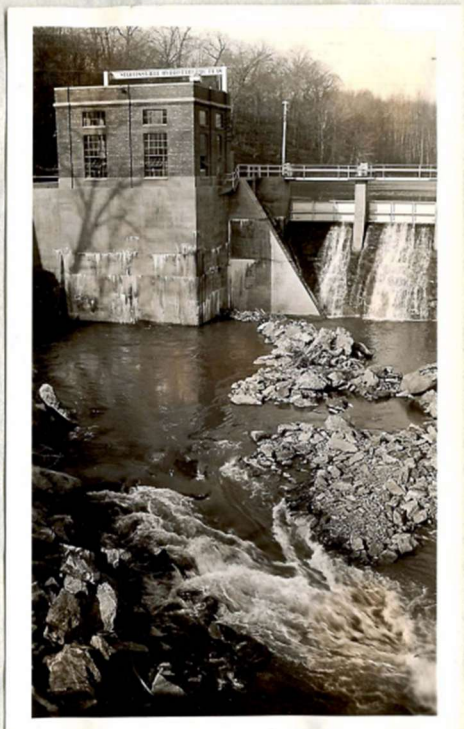
xxx New Hydro-electric plant started May 5, 1932

X Martinsville Municipal Hydro Plant

Martinsville Municipal Hydro Plant

Old Municipal Hydro Plant

Martinsville Municipal Hydro Plant



Martinsville Municipal Hydro Plant

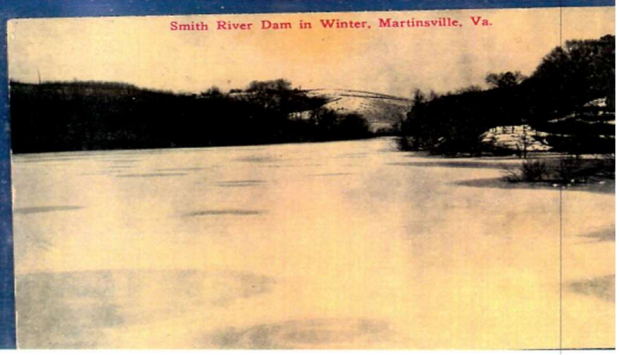
Industrial Plants in Martinsville
Population 1930 Census 7705

	Connected Horse Power	Approximate Number Employees
Furniture		
1. American Furniture Company	1250	1,000
2. William Bassett Furniture Company	750	550
3. Gravely Novelty Furniture Company	200	100
4. Hooker-Bassett Furniture Company	550	400
5. Martinsville Novelty Corporation	200	100
6. Morris Novelty Furniture Company	100	75
7. Virginia Mirror Company	40	30
Textiles		
8. Martinsville Cotton Mill Company	800	350
9. Martinsville Silk Corporation (Now shut down)	60	(150)
10. Pannill Knitting Company	125	300
11. Southern Silk Garment Company (Shut down)	10	(50)
12. Virginia Underwear Corporation	50	100
Tobacco		
13. R. J. Reynolds Tobacco Company	50	200
14. Sparrow & Gravely Tobacco Company	20	75
Miscellaneous		
15. Aaron Brothers Flour Mill	75	5
16. American Truck & Body Company	20	5
17. C. J. Cheshire Machine Shop & Foundry	15	4
18. Coca Cola Bottling Company	5	5
19. Martinsville Creamery & Cold Storage	60	6
20. Cross Laundry Company	30	50
21. L. & F. Repair Company - Upholstery	5	3
22. Lester Lumber Company	200	30
23. Martinsville Bakery Company	10	5
24. Martinsville Gas Company	20	2
Totals -	4,645	3,595


SMITH RIVER DAM, MARTINSVILLE, VA.

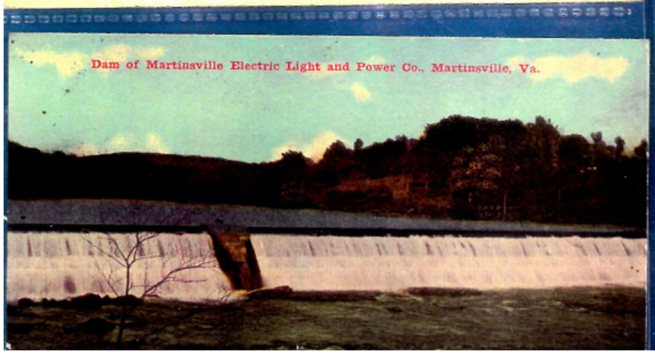

Pub. by Kearfott's Pharmacy
Dam on Smith River, Martinsville, Virginia.


SMITH RIVER DAM, MARTINSVILLE, VA.


Smith River Dam in Winter, Martinsville, Va.


DAM OF
MARTINSVILLE ELECTRIC LIGHT & POWER CO.
MARTINSVILLE, VA.


MARTINSVILLE, VA.
Smith's River Dam.


Dam of Martinsville Electric Light and Power Co., Martinsville, Va.


Dam of Martinsville Electric Light and Power Co., Martinsville, Va.

Appendix 10 Dennis Bowles September 2000 Report on Smith River Dam and Hydro-electric Plant (Bowles, 2000)

Smith River Dam and Hydro-electric Plant

In 1905 the Town of Martinsville decided to provide electric service to its residents and businesses. The Town purchased the Hairston Mill site and the R. J. Reynolds mill site and the wooden dam, which were located at the present dam site south of town. A rock and mortar dam was built replacing the mills and wooden dam. A 1000-foot raceway was constructed on the north side leading down stream to a hydroelectric plant. The hydro-plant was built on a rock foundation with sheet metal walls. (The foundation is now part of a garage for the Peoples Save Gasoline Stations.) On June 26, 1906 the dam and power station were put into operation. There were two 150 kW belt driven generators connected to two S. Morgan Smith water wheels.

In 1910 the dam was raised six feet and the 150 kW generators were replaced with two 250 kW generators and a new 300 kW generator and water wheel was added. This plant continued to serve Martinsville's power needs until 1927 when Appalachian Electric Power Company (APCO) built a line from Fieldale to the Martinsville Cotton Mill (present site of Tultex). In 1928, APCO made interconnection through the cotton mill substation to the Martinsville power plant.

In the early 1930's the city saw a need to update the hydro plant due to increasing electrical loads. It was decided to construct a new plant on the south side of the rock dam and raise the dam. The old plant was shut down on January 25, 1932 and part of the switchboard was removed and installed in the new plant. The old plant could still be used and was operated until a short time after start up of the new plant. On May 5, 1932 the new plant with 1-1000 kW generator and 1- 300 kW generator was placed in operation. Two operators working 12-hour shifts manned the plant and a helper worked a 10-hour shift.

The plant remains in operation today but has been through several overhauls and changes. Outlined below is some of the changes or problems beginning with my earliest experiences with the plant:

- December 1973, the plant was still operated twenty-four hours a day, seven days a week by a staff of four operators working 8 hour shifts, 48 hours weekly.
- August 1974, the plant was scaled back to two operators working 8-hour shifts 40 hours per week and run as a peaking plant ceasing the 42-year history of continuous operation.

- February 5, 1980, the 1000 kW generator's water wheel sheared off and fell into the river. The Electric Department personnel disassembled the water wheel, turbine and shafts removing them from the river. At this time it was decided to rewind the generator while repairs were being made to the turbine and shafts
- May 27, 1987, the turbine draft tube on the 1000 kW unit broke loose and fell into the river. A new one was made and installed after 7 months down time.
- August 27, 1987, lightning ran in on the plant causing two surge arrestors to fail and shorting out the generator winding on the 300 kW unit. The unit was rewound increasing the output to 450kW.
- January 1989, the Supervisory Control and Data Acquisition System (SCADA) was installed. This greatly improved the accuracy of peak shaving efforts and improved generation during peak hours by providing detailed system load information in real time. The value of the hydro-plant became considerable and easily measurable.
- March 1989 personnel were scaled back to one full time position and a part-time position was added to work as needed.
- July 1994, the downstream side of the rock face dam was grouted or covered over with a concrete and sand mixture at a cost of $192,395.00. Holes were bored deep into the dam and grout was pumped in to the core of the dam to seal the leaks.
- January 16, 1995, Nine inches of rain fell in 24 hours causing a flash flood condition in the Jordan Creek area upstream from the dam. High water gauging stations are located in Bassett, which are upstream of Jordan Creek. The flood was undetected by the gauges and rushed in on the dam and plant causing the emergency spillway to overrun and the water level reached a level two feet above flood stage. This amount of water was never anticipated and destroyed the spillway. Within the following year a new spillway was designed and constructed at a cost of $174,500.00 to withstand floods of this magnitude.
- July 1, 1998, The City entered into a contract with Cinergy Inc. to provide power to its system. This contract provides inexpensive power and no demand charge, ending a 70-year association with APCO (now called American Electric Power or AEP) as a power supplier to the City. The hydro plant is run as a peaking plant due to a transmission agreement with AEP to transport Cinery power to the city. If the plant ceased operations as a peaking plant, the City would be required to pay AEP an extra $31,680.00 in 1999. This figure changes according to how much our demand is for each month during the year, through the end of the Cinergy contract (2005).
- October 1, 1998 after years of using poles to construct a trash diversion boom a new boom was purchased and installed at a cost of $8702.00. This

new boom is constructed of a steel frame with foam molded around it, enclosed in a tough plastic casing.

- April 2000, Voith Hydro Inc. completed a rebuild on the 450kW-turbine unit at a cost of $172,450.00. A new long shaft, jack shaft and head cover were made, the lower crown plate was machined to allow installation of bearings for the wicket gates to pivot on. The water wheel was trimmed down and new coupling bolts installed.

Today the City purchases approximately 98% of its power from Cinergy Inc. and power is transported through AEP transmission lines to the City. This power contract will expire in June 2005. The hydro-plant is still used as a peak generating station with an output of 1350 kW. Yearly the plant nets around $160,000.00 income to the city. Due to low water flow, the plant generates electricity only six to eight hours a day. The generators consume about 600 cubic feet per second (cfs) of water at peak operation. In comparison Philpott Dam, which is approximately 20 miles upstream releases 1260 cfs of water during most generation periods. Water released from Philpott Dam reaches the City's dam six hours later. The excess water released from Philpott fills the reservoir and then spills over the dam. Water is also released continuously from the City's dam at a rate of at least 34 cfs. This release assists the Water Resources Department's downstream wastewater treatment plant with its need to comply with State and EPA mandated water quality standards and discharge permit requirements that are based on minimum flows recorded in the Smith River.

The City's dam is regulated and licensened by the Virginia Dam Safety Agency. The dam is considered a Class I dam and is inspected every two years by a consulting engineer and a report is prepared on its condition and forwarded to the Office of Dam Safety. During flooding conditions, the plant is manned 24 hours a day until flooding conditions cease. Floodgates have to be raised and downstream flows monitored to prevent flooding of property and for the safety of the public. Extensive operator training is required to comply with the strict state standards for operation of this Class I dam.

Note: Prepared by Dennis Bowles
September 2000
Excerpts taken from the 1933
Report on Municipal Electric Plant
Martinsville, VA.
Prepared by Bryant White

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